

**Classification of the Vegetation of Yosemite National Park
and Surrounding Environs in Tuolumne, Mariposa, Madera and Mono Counties,
California**

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TABLE OF CONTENTS FOR YOSEMITE CLASSIFICATION REPORT

Section	Page
I. INTRODUCTION.....	1
Precedents.....	1
Study Area.....	2
Ecological Zones.....	2
II. METHODS.....	4
Vegetation Sampling and Classification.....	4
Sample Allocation and Development of GRADSECT.....	5
Field Data Collection.....	10
Archiving and Analysis of Data.....	11
Ancillary Data Sets.....	15
Classification and Keys.....	15
III. RESULTS: CLASSIFICATION AND KEY.....	17
The NVCS Classification for Yosemite.....	17
Dichotomous Key to Yosemite Alliances and Associations.....	17
Literature Cited.....	73
IV. DESCRIPTIONS OF VEGETATION ASSOCIATIONS WITHIN YOSEMITE VEGETATION MAPPING AND CLASSIFICATION PROJECT BOUNDARIES....	78
ECOLOGICAL ZONES I AND II: CHAPARRAL, OAK WOODLANDS, LOW ELEVATION CONIFEROUS AND BROAD-LEAVED SCLEROPHYLL FORESTS AND WOODLANDS OF THE WEST SLOPE	81
HERBACEOUS ASSOCIATIONS.....	81
Elymus glaucus - Carex pellita Herbaceous Vegetation [Provisional].....	81
Elymus glaucus - Carex feta Herbaceous Vegetation [Provisional].....	83
Bromus hordeaceus – Bromus diandrus –(B. madritensis) - Trifolium microcephalum – Daucus pusillus Herbaceous Vegetation [Provisional].....	85
TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE [Provisional].....	87
SHRUB/SCRUB ASSOCIATIONS.....	90
Lupinus albifrons Shrubland [Provisional].....	90
Adenostoma fasciculatum Shrubland [Provisional].....	92
Adenostoma fasciculatum - Ceanothus cuneatus Shrubland [Provisional].....	93
Arctostaphylos viscida Shrubland.....	95
Ceanothus cuneatus/Bromus spp. Shrubland [Provisional].....	98
Ceanothus integerrimus - Arctostaphylos viscida - (Arctostaphylos mewukka) Shrubland [Provisional].....	100
Chamaebatia foliolosa-Arctostaphylos viscida Dwarf-Shrubland [Provisional].....	102
FORESTS AND WOODLANDS.....	105
Quercus chrysolepis - Umbellularia californica Forest.....	105
Quercus chrysolepis / Arctostaphylos viscida Forest.....	107
Quercus chrysolepis/Arctostaphylos patula Forest.....	108
Quercus chrysolepis – Pinus sabiniana Forest.....	110
Quercus chrysolepis /Dryopteris arguta Forest.....	112
Quercus chrysolepis – Pinus ponderosa Forest.....	114
Quercus chrysolepis - Calocedrus decurrens Forest.....	115

Pinus ponderosa - Calocedrus decurrens /Chamaebatia foliolosa Forest.....	118
Pinus ponderosa - Calocedrus decurrens – Quercus kelloggii Forest.....	119
Pinus ponderosa - Calocedrus decurrens - Quercus chrysolepis / Chamaebatia foliolosa Forest.....	121
Calocedrus decurrens - Alnus rhombifolia Forest.....	124
Pseudotsuga menziesii - Abies concolor - Calocedrus decurrens Forest.....	127
Pseudotsuga menziesii - Pinus ponderosa - Calocedrus decurrens Forest.....	128
Pseudotsuga menziesii - Quercus chrysolepis Forest.....	130
Quercus kelloggii / Arctostaphylos mewukka - Chamaebatia foliolosa Forest [Provisional]	133
Quercus kelloggii / Arctostaphylos patula Forest.....	135
Quercus kelloggii - Calocedrus decurrens Forest [Provisional].....	138
Alnus rhombifolia Forest.....	139
Populus balsamifera / Rhododendron occidentale Forest [Provisional].....	141
Pinus attenuata / Arctostaphylos viscida Woodland [Provisional].....	143
Pinus ponderosa - Quercus kelloggii / Arctostaphylos viscida Woodland [Provisional].....	145
Pinus sabiniana - Quercus wislizeni / Ceanothus cuneatus Woodland [Provisional].....	147
Pinus sabiniana - Quercus wislizeni /Arctostaphylos viscida Woodland [Provisional].....	149
Quercus wislizeni - Quercus chrysolepis Woodland [Provisional].....	151
Quercus wislizeni - Arctostaphylos viscida Woodland [Provisional].....	153
Quercus wislizeni - Quercus douglasii - Pinus sabiniana/Bromus sp-Daucus pusillus Woodland.....	156
Cercocarpus montanus var. glaber Woodland.....	158
Quercus douglasii / Ceanothus cuneatus / Poaceae Forest.....	160
Quercus douglasii - Pinus sabiniana / Poaceae Woodland.....	162
Quercus douglasii / Bromus sp. - Daucus pusillus Woodland [Provisional].....	164
Quercus douglasii - Quercus wislizeni / Bromus sp. - Daucus pusillus Woodland.....	166

ECOLOGICAL ZONE III: FORESTS, SCRUBS, AND MEADOWS OF THE MID-

ELEVATION WEST SLOPE.....169

HERBACEOUS VEGETATION..... 169

Lupinus latifolius Herbaceous Vegetation [Provisional].....	169
Solidago canadensis - Achillea millefolium Herbaceous Vegetation [Provisional].....	171
Veratrum californicum - Senecio triangularis Herbaceous Vegetation.....	172
Glyceria striata Herbaceous Vegetation [Provisional].....	174
Poa pratensis Seasonally Flooded Herbaceous Vegetation.....	176
Carex vesicaria Herbaceous Vegetation.....	178
Carex utriculata Herbaceous Vegetation.....	179
Carex nebrascensis Herbaceous Vegetation.....	181

SHRUB/SCRUB ASSOCIATIONS..... 183

Arctostaphylos patula Shrubland.....	183
Ceanothus cordulatus Shrubland.....	185

Section	Page
Quercus vaccinifolia - Chrysolepis sempervirens Shrubland [Provisional].....	187
Quercus vaccinifolia - Arctostaphylos patula Shrubland.....	188
Prunus emarginata Shrubland [Provisional].....	190
Chrysolepis sempervirens Shrubland.....	192
FORESTS AND WOODLANDS.....	195
Populus tremuloides/Veratrum californicum Forest.....	195
Abies concolor-Pinus lambertiana/Ceanothus cordulatus Forest.....	197
Abies concolor-Pinus lambertiana-Pinus jeffreyi Forest.....	198
Abies concolor - Pinus lambertiana - Abies magnifica Forest.....	200
Abies concolor - Pinus lambertiana Forest.....	203
Abies concolor - Pinus lambertiana/Maianthemum racemosum - Prosartes hookeri Forest	205
Abies concolor - Calocedrus decurrens - Pinus lambertiana/Cornus nuttallii/Corylus cornuta Forest.....	206
Abies concolor - Calocedrus decurrens - Pinus lambertiana/Adenocaulon bicolor Forest...	208
Abies concolor - Calocedrus decurrens - Pinus lambertiana/Chrysolepis sempervirens Forest	210
Abies concolor - Calocedrus decurrens - Pinus lambertiana/Symphoricarpos mollis/Kelloggia galioides Forest.....	212
Abies magnifica/Wyethia mollis Forest.....	214
Abies magnifica - Pinus monticola/Chrysolepis sempervirens Forest.....	215
Abies magnifica - Pinus monticola Forest.....	217
Abies magnifica - Pinus monticola/Arctostaphylos nevadensis Forest.....	219
Abies magnifica - Pinus monticola - Pinus contorta var. murrayana Forest.....	221
Abies magnifica Forest.....	223
Abies magnifica/Arctostaphylos nevadensis Forest.....	225
Abies magnifica - Pinus contorta var. murrayana/Hieracium albiflorum Forest.....	227
Sequoiadendron giganteum - Pinus lambertiana/Cornus nuttallii Forest.....	230
Pinus jeffreyi - Abies magnifica Woodland.....	233
Pinus jeffreyi/Chrysolepis sempervirens Woodland.....	234
Pinus jeffreyi/Quercus vacciniifolia Woodland.....	236
Pinus jeffreyi - Abies concolor Woodland.....	238
Pinus jeffreyi/Arctostaphylos patula Woodland.....	241
Pinus jeffreyi/Ceanothus cordulatus Woodland [Provisional].....	243
Abies magnifica - Abies concolor - Pinus jeffreyi Forest.....	245
Abies magnifica - Abies concolor Forest.....	246
ECOLOGICAL ZONE IV: SUBALPINE FORESTS, WOODLANDS AND MEADOWS OF THE WEST SLOPE	249
HERBACEOUS ASSOCIATIONS.....	249
Carex spectabilis- Senecio triangularis Herbaceous Vegetation.....	249
Deschampsia caespitosa - Polygonum bistortoides Herbaceous Vegetation.....	251
Calamagrostis breweri - Vaccinium caespitosum Herbaceous Vegetation.....	253
Calamagrostis breweri - Oreostemma alpigenum var. alpigenum Herbaceous Vegetation [Provisional].....	254
Calamagrostis breweri - Trisetum spicatum Herbaceous Vegetation [Provisional].....	256
Calamagrostis breweri - Juncus drummondii Herbaceous Vegetation.....	259
Calamagrostis canadensis Herbaceous Vegetation [Provisional].....	260

Ptilagrostis kingii Herbaceous Vegetation [Provisional].....	263
Danthonia intermedia – Antennaria rosea Herbaceous Vegetation [Provisional].....	265
Carex exserta - Cistanthe spp. Herbaceous Vegetation.....	266
Carex exserta - Trisetum spicatum Herbaceous Vegetation [Provisional].....	268
Carex exserta - Penstemon heterodoxus Herbaceous Vegetation [Provisional].....	270
Carex nigricans - Kalmia polifolia Herbaceous Vegetation [Provisional].....	272
Carex scopulorum var. bracteosa - Pedicularis groenlandica Herbaceous Vegetation.....	273
Carex scopulorum - Eleocharis quinqueflora Herbaceous Vegetation.....	275
Eleocharis quinqueflora Herbaceous Vegetation.....	277
Sparganium angustifolium Herbaceous Vegetation [Provisional].....	278
Penstemon newberryi – Streptanthus tortuosus/Selaginella watsonii Herbaceous Vegetation [Provisional].....	280
SHRUB/SCRUB ASSOCIATIONS.....	283
Artemisia tridentata ssp. vaseyana/Carex exserta Shrubland [Provisional].....	283
Spiraea splendens/Penstemon newberryi - Streptanthus tortuosus Wooded Herbaceous Vegetation.....	284
Salix eastwoodiae Seasonally Flooded Shrubland.....	286
Salix orestera/Allium validum Shrubland.....	288
Salix orestera/Senecio triangularis Shrubland.....	290
Salix orestera/Calamagrostis breweri Shrubland.....	293
Salix lemmonii Shrubland [Provisional].....	295
Salix melanopsis Shrubland [Provisional].....	297
Holodiscus discolor/Sedum obtusatum ssp. boreale - Cryptogramma acrostichoides Shrubland [Provisional].....	298
Holodiscus discolor - Sambucus racemosa Shrubland [Provisional].....	301
Vaccinium caespitosum/Carex exserta Dwarf-Shrubland [Provisional].....	302
Vaccinium uliginosum Dwarf-Shrubland.....	304
FORESTS AND WOODLANDS.....	307
Pinus contorta var. murrayana Forest.....	307
Pinus contorta var. murrayana/Ligusticum grayi Forest.....	309
Pinus contorta var. murrayana Woodland.....	310
Pinus contorta var. murrayana/Penstemon newberryi Sparse Vegetation.....	312
Pinus contorta var. murrayana - Artemisia tridentata Forest.....	314
Pinus contorta var. murrayana/Ledum glandulosum Forest.....	316
Pinus contorta var. murrayana - Vaccinium uliginosum Forest.....	319
Pinus contorta var. murrayana / Carex rossii Forest.....	320
Pinus contorta var. murrayana / Carex exserta Forest.....	322
Pinus contorta var. murrayana - Pinus albicaulis - Carex rossii Forest.....	325
Pinus contorta var. murrayana - Pinus albicaulis/Carex exserta Forest [Provisional].....	326
Pinus monticola – Pinus contorta var. murrayana/Achnatherum occidentale Forest [Provisional].....	328

Section	Page
Tsuga mertensiana Forest.....	330
Tsuga mertensiana- Pinus monticola Forest.....	332
Tsuga mertensiana - Pinus contorta var. murrayana Forest.....	334
Tsuga mertensiana - Pinus contorta - Pinus monticola Forest.....	336
Pinus albicaulis - Tsuga mertensiana Woodland.....	339
Pinus albicaulis/Carex exserta Woodland.....	340
Pinus albicaulis/Penstemon davidsonii Woodland [Provisional].....	342
Pinus albicaulis/Carex rossii Woodland [Provisional].....	344
Juniperus occidentalis var. australis Woodland.....	346
Juniperus occidentalis var. australis/Holodiscus discolor Woodland.....	348
ECOLOGICAL ZONES V AND VI: THE EAST SLOPE AND WEST SLOPE ALPINE..	350
HERBACEOUS ASSOCIATIONS.....	350
Calamagrostis purpurascens - Leptodactylon pungens Herbaceous Vegetation.....	350
Carex breweri Herbaceous Vegetation.....	351
Carex helleri - Eriogonum incanum - Raillardella argentea Herbaceous Vegetation.....	354
Carex helleri - Saxifraga tolmiei - Luzula divaricata Herbaceous Vegetation.....	357
Carex spectabilis - Sibbaldia procumbens Herbaceous Vegetation.....	358
Juncus parryi - Eriogonum incanum Herbaceous Vegetation.....	361
Juncus parryi - Phyllodoce breweri Herbaceous Vegetation.....	362
Hulsea algida - Ericameria discoidea - Phacelia hastata var. compacta Herbaceous Vegetation [Provisional].....	364
Phlox covillei - (Phlox condensata) - Elymus elymoides - Podistera nevadensis Herbaceous Vegetation.....	367
Podistera nevadensis - Elymus elymoides - Erigeron pygmaeus Herbaceous Vegetation...	368
Sedum integrifolium- Selaginella watsonii Herbaceous Vegetation.....	371
Pentaphylloides floribunda/Danthonia intermedia Herbaceous Vegetation [Provisional]...	372
(SUB)SHRUB/SCRUB ASSOCIATIONS OF ZONES V AND VI	375
Artemisia rothrockii/Monardella odoratissima Dwarf-Shrubland.....	375
Salix arctica - Calamagrostis breweri - Vaccinium caespitosum - Antennaria media Dwarf- Shrubland.....	376
ECOLOGICAL ZONES VII AND VIII: THE EAST SLOPE FORESTS, WOODLANDS, AND SCRUBS.....	379
HERBACEOUS VEGETATION.....	379
Juncus balticus - Juncus mexicanus Herbaceous Vegetation.....	379
SHRUB/SCRUB ASSOCIATIONS.....	381
Ceanothus velutinus - Prunus emarginata - Artemisia tridentata Shrubland [Provisional]..	381
Artemisia cana/Iris missouriensis - Juncus balticus Shrubland [Provisional].....	382
Artemisia arbuscula/Leptodactylon pungens Dwarf-Shrubland [Provisional].....	384
Artemisia arbuscula - Eriogonum microthecum Dwarf-Shrubland [Provisional].....	386
Artemisia tridentata ssp. tridentata/Achnatherum hymenoides Shrubland [Provisional].....	390
Artemisia tridentata ssp. vaseyana/Monardella odoratissima Shrubland [Provisional].....	391
Purshia tridentata - Artemisia tridentata - Tetradymia canescens Shrubland [Provisional].	393
Purshia tridentata - Artemisia tridentata/Achnatherum hymenoides Shrubland [Provisional]	395

Purshia tridentata - Artemisia tridentata/Achnatherum nevadense - (Achnatherum nelsonii) Shrubland [Provisional].....	396
Purshia tridentata - Artemisia tridentata - Symphoricarpos rotundifolius Shrubland [Provisional].....	399
Purshia tridentata - Artemisia tridentata/Eriogonum umbellatum Shrubland [Provisional].....	400
Salix exigua/Juncus spp. Shrubland [Provisional].....	402
FORESTS AND WOODLANDS.....	404
Populus tremuloides/Artemisia tridentata Forest [Provisional].....	404
Populus tremuloides/Monardella odoratissima Forest.....	405
Populus tremuloides/Artemisia tridentata/Monardella odoratissima - Kelloggia galioides Forest [Provisional].....	407
Populus tremuloides - Pinus jeffreyi Forest.....	409
Populus tremuloides/Poa pratensis Forest [Provisional].....	411
Populus tremuloides/Rosa woodsii Forest [Provisional].....	413
Populus balsamifera ssp. trichocarpa - Pinus jeffreyi Forest [Provisional].....	414
Populus tremuloides-Pinus contorta/Artemisia tridentata/Poa pratensis Forest [Provisional].....	416
Juniperus occidentalis var. australis - Cercocarpus ledifolius/Artemisia tridentata Woodland [Provisional].....	418
Juniperus occidentalis var. australis/Artemisia tridentata Woodland.....	420
Pinus jeffreyi - Pinus monophylla Woodland.....	422
Pinus jeffreyi/Purshia tridentata Woodland.....	423
PINUS JEFFREYI/CERCOCARPUS LEDIFOLIUS WOODLAND.....	425
Pinus jeffreyi - Abies concolor/Symphoricarpos rotundifolius/Elymus elymoides Woodland [Provisional].....	428
Pinus monophylla/Cercocarpus ledifolius/Artemisia tridentata - Purshia tridentata Woodland [Provisional].....	429
Pinus monophylla/Ribes velutinum Woodland [Provisional].....	431
Pinus monophylla/Artemisia tridentata/Elymus elymoides Woodland [Provisional].....	433
Cercocarpus ledifolius/Symphoricarpos rotundifolius Woodland.....	434
APPENDIXES	437
APPENDIX 1: PRELIMINARY VEGETATION CLASSIFICATIONS—FEBRUARY 1998 VERSION.....	1
APPENDIX 2: NATURAL RESOURCE INVENTORY PROTOCOL AND METADATA...	1
APPENDIX 3: FIELD SAMPLING PROTOCOL AND FIELD FORMS.....	1
APPENDIX 4: FUELS SAMPLING PROTOCOLS.....	1

Section

Page

APPENDIX 5: NEW VEGETATION TYPES..... 1

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I. INTRODUCTION

The U.S. Geological Survey (USGS) and National Park Service (NPS) formed a partnership in 1994 to map the vegetation of United States national park system units using The Nature Conservancy's National Vegetation Classification, a standard for reporting vegetation information among federal agencies (Grossman et al., 1998). Goals of the projects include providing baseline ecological information to resource managers in the parks; putting these data into regional and national contexts; and providing opportunities for future inventory, monitoring, and research activities. Each park developing a vegetation map follows a standardized field sampling and vegetation classification protocol to document the various vegetation types found in a given park. This information is used by photointerpreters to delineate polygons of vegetation communities, which are subsequently subjected to an accuracy assessment process (USGS 1997). The final products consist of a vegetation map, descriptions of each vegetation type, a key to each type, and all related data and metadata files (original field forms, plot database, accuracy assessment points, etc.). This report presents the work conducted at Yosemite National Park and environs conducted from 1997 to 2001.

BACKGROUND AND STANDARDS

The vegetation classification applied throughout this report, the U.S. National Vegetation Classification (USNVC), was developed by NatureServe (formerly The Nature Conservancy) in partnership with the network of State Natural Heritage Programs. Additional support was provided by federal agencies and the Ecological Society of America. A first edition of the classification has been released that provides a thorough introduction to the classification, its structure, and the list of vegetation units known in the United States as of April 1997 (Grossman et al., 1998). Refinements to the classification occurred in the application process, leading to ongoing proposed revisions that are reviewed both locally and nationally. These refinements are best seen using the NatureServe Web site at <http://www.natureserveexplorer.org/servlet/NatureServe?init=Ecol>.

Vegetation mapping in national parks has been done under the auspices of the NPS Inventory and Monitoring program, in close cooperation with the USGS Biological Resources Division. The mapping is done in accordance with standards established by the Federal Geographic Data Committee (FGDC) for vegetation mapping on federal lands. The FGDC Web site, <http://biology.usgs.gov/fgdc.veg/standards/vegstd.htm>, explains the development of the classification standards now used for mapping and classifying vegetation in national parks. The USGS Biological Resources Division—NPS Vegetation Mapping project Web site, <http://biology.usgs.gov/npsveg/standards.html>, has additional information on vegetation mapping in national parks.

The development of a vegetation map and concomitant classification is a complex project. Not all vegetation types are equally mappable at a certain scale. Coordination between the aerial photointerpreters and the vegetation classification team is needed to resolve the best way to map the types, whether directly at the association level, at the higher classification levels (such as at the alliance), or as a mosaic or complex. Thus, not all types described in this report are necessarily mapped directly. A separate report will document the link between the mapping and the field-based vegetation classification.

PRECEDENTS

The Yosemite mapping project was initiated in 1996 when NatureServe, ESRI, Aerial Information Systems (AIS), NPS, and USGS met to discuss the use of Yosemite as a pilot for the recently formed NPS mapping program. Yosemite was to become the first large national park (defined as any park over 150,000 acres) to be mapped. These documents (online at <http://biology.usgs.gov/npsveg/standards.html>) detail the basis for the mapping concepts used in the Yosemite project.

The principal issues at hand for this first large park mapping project were the following:

- To implement a GIS-based gradient-directed transect (GRADSECT) approach for sampling.
- To integrate the vegetation sampling process with the photointerpretation process so a seamless, mutually beneficial feedback loop would develop with the field crews providing information to the mappers while, at the same time, the mappers would be supporting decisions by the field crews about where and what to sample.

- To integrate a large amount of existing vegetation data that had been collected since the 1930s with the necessary field data to be collected during this project into a unified vegetation classification that would be used for the final products.

The purpose of developing the classification for the area to be mapped was to integrate a large amount of new information into the California vegetation classification and the USNVC. This report provides the basis to achieve that goal. By standardizing the reporting structure of each new classification unit, NatureServe will be able to integrate this information into the classification.

STUDY AREA

Yosemite National Park was one of the first national parks to be established, with Yosemite Valley set aside by Congress in 1864 and the remainder of the park established in 1890. The park itself encompasses approximately 1,200 square miles (768,000 acres). However, the vegetation mapping project encompasses a larger area totaling about 1.2 million acres called the "environs." This area includes an extremely diverse array of habitats including grasslands, chaparral, broad-leaved evergreen and deciduous oak woodlands, coniferous forests and woodlands, montane wetland scrubs and meadows, extensive alpine areas, and Great Basin woodlands and sagebrush–bitterbrush scrubs. It provides a vegetation transect across the majority of the Sierra Nevada at just over 13,000 feet, and down to the Mono Lake Basin in the Great Basin at about 6,500 feet. Including the buffer area, the project covers not only lands administered by the National Park Service, but extensive lands administered by the U.S. Forest Service (USFS) in four national forests as well as lands administered by the Bureau of Land Management east of the Sierra Crest. There are small pockets of private land scattered throughout the environs.

ECOLOGICAL ZONES

Because the environs is such a large area, it was necessary to identify ecological zones to aid with project planning and implementation. Delineation of ecological zones was largely based on elevation zones, with the elevational break corresponding with major vegetation transition (e.g., mixed conifer to fir belt, fir belt to subalpine, subalpine to alpine). The zones, numbered one through eight, serve as a geographical orientation to the study and are briefly discussed below.

Zone I: West-slope Oak–Chaparral

This west slope zone ranges from 1,400 to 3,000 feet in elevation and contains primarily foothill chaparral and oak woodlands. The majority of this zone is outside the park. It ranges from the confluence of the South Fork Merced River with the Merced River to Yosemite Valley in the Merced drainage and from the confluence of the Middle Tuolumne River with the Tuolumne River to Hetch Hetchy in the Tuolumne drainage. At the upper elevations of Zone I, the transition to mixed conifer occurs, characterized by ponderosa pine and incense cedar. The geologic substrate is largely metamorphic outside of the park and largely granitic inside the park. Slopes are steep and rugged, and vegetation is strongly influenced by aspect. Vegetation is also strongly influenced by the relatively hot and dry summers and the relatively warm winters. Snowfall is intermittent and most precipitation falls as rain. The predominant species of vegetation in this zone are chamise, whiteleaf manzanita, blue oak, interior live oak, foothill pine, annual grasslands, and low elevation riparian stands.

Zone II: West-slope Lower Mixed Conifer

This westside zone ranges from 3,000 to 5,000 feet in elevation and contains primarily mixed coniferous forests. The majority of this zone is inside the park. It ranges from Yosemite Valley to Crane Flat and Chinquapin. The geology is almost entirely granitic. Precipitation falls as both rain and snow, and the snow level for winter storms is often in this elevation range. The predominant species of vegetation in this zone are canyon live oak, ponderosa pine, black oak, Douglas-fir, and incense cedar.

Zone III West-slope Red Fir Belt

This westside zone ranges from 5,000 to 7,000 feet in elevation. The majority of this zone is inside the park. It ranges from Crane Flat and Chinquapin to Tenaya Lake and Glacier Point. The geologic substrate is almost entirely granitic, except for some volcanic mudflows in the northwest part of the environs. Precipitation falls largely as snow, and this zone has the highest precipitation of the environs. The terrain is gentle compared to other parts of the environs, with broad slopes instead of steep canyons and jagged peaks. Dense forests on alluvium and glacial deposits are composed of white fir, red fir, and sugar pine and western white pine at the upper elevations. The three giant sequoia groves occur in this zone. Jeffrey pine woodlands and montane chaparral occur on shallow soils and granitic knobs. Meadows and riparian thickets are predominant along the many creeks, streams, and saturated flats.

Zone IV: West-slope Subalpine Conifer

This westside zone ranges from 7,000 to 9,000 feet in elevation. The majority of this zone is inside the park. It ranges from Tenaya Lake to Tioga Pass and Mono Pass. The geologic substrate is largely granitic with much of the area covered with a thin veil of soil over glacially scoured slopes and valleys. Extensive meadow complexes such as the Tuolumne Meadows are found in this zone, containing a complex matrix of hydric and mesic herbaceous and scrub vegetation. Predominant tree species include mountain hemlock, lodgepole pine, and whitebark pine.

Zones V and VI: Alpine

This zone straddles the crest of the Sierra Nevada, above 9,000 feet. It is the alpine zone, although alpine vegetation is occasionally found below this elevation in sheltered, cold air drainages. The alpine zone west of the crest is largely inside the park; the alpine zone east of the crest is entirely outside the park. The geologic substrate is largely granitic and metamorphic, with some volcanic. The slopes can be extremely steep, but there are also plateaus and benches with gentle slopes. In most cases, vegetation is divided between sparse low productivity upland sites where vegetation covers far less area than bare exposed outcrops, boulders, talus, and scree and low-lying hydric to moist sites where vegetation predominates in willow thickets and alpine meadows surrounding streams, tarns, and lakes. Variation in alpine vegetation appears to be driven more by differences in substrate than by position east or west of the Sierra Nevada crest.

Zone VII: East-Slope Conifers

This eastside zone ranges from 7,000 to 9,000 feet elevation. It is entirely outside the park. The geologic substrate is largely volcanic. The slopes can be extremely steep, but there are glacial and alluvial deposits that have gentle slopes or are flat. The predominant species of vegetation include Jeffrey pine, western juniper, pinyon pine, aspen, cottonwood, and riparian scrubs.

Zone VIII: East-Slope Pinyon-Sage

This zone is below 7,000 feet elevation. It is entirely outside of the park. The geologic substrate is largely volcanic. The slopes can be extremely steep, but there are glacial and alluvial deposits that have gentle slopes or are flat.

Zones VII and VIII include part or all of the upper San Joaquin drainage, Devil's Postpile, Lee Vining Canyon, Lundy Canyon, Green Lakes, Virginia Canyon, Buckeye Creek, and Twin Lakes.

II. METHODS

VEGETATION SAMPLING AND CLASSIFICATION

Development of the Preliminary Classification

Before any work began on the map, the California ecologists for the project Todd Keeler–Wolf (NatureServe/California Heritage) and Peggy Moore (USGS) had to develop a preliminary classification. This was needed to drive the field sampling effort (approximately how many field samples were to be collected) and to determine the effort needed for the photointerpretation of the vegetation polygons (how many mapping units should be used and were those mapping units directly interpretable from the vegetation classification).

In 1997 a preliminary classification for the mapping area was developed using the existing California vegetation classification (Sawyer and Keeler–Wolf, 1995) in conjunction with the local knowledge vegetation ecologists at the park had that went beyond the recent summary of California's vegetation. The classification was refined to comply with the National Vegetation Classification standards. The working preliminary classification used to prioritize plot collection along with the ecoregions assigned to each vegetation type is displayed in Appendix 1. In addition to the approximately 300 existing classification units (alliances and associations) gleaned from the literature, 63 preliminary classification units were added by Yosemite Research Center staff to account for unquantified variations in the Yosemite classification.

Integration of Existing Data Sets

An extensive amount of data had already been collected on the vegetation of the Yosemite area before this mapping project began. These included three separate sets collected for different purposes, using different methods. One of the principle goals of this large park mapping and classification pilot project was to determine how well the existing data could be integrated into the classification. To better understand the amount of field effort needed to round out the classification, the number of existing data plots likely to represent different vegetation types needed to be determined. The ecologists thus spent much time evaluating the existing data sets and assigning each of the existing plots with an attribute based on the preliminary classification. The following briefly describes the data sets.

Wieslander data: These data collected by field crews for the Vegetation Type Mapping (VTM) project amounted to 754 field plots from the Yosemite National Park and environs. These were collected between 1935–1937 and therefore provide a valuable historic reference for the vegetation as it occurred shortly after the inception of fire protection throughout the Sierra Nevada. Data included 0.1-acre plots for trees and shrubs with brief notes on understory herbaceous species. For a full description of the VTM project and methods, see Wieslander (1948). Generally the wooded vegetation of the mapping area was well covered by this effort and as a result many of the forest and woodland vegetation types were well represented in the Wieslander data. However, Wieslander samples tended to ignore herbaceous vegetation and vegetation with small average stand sizes.

In an independent effort prior to this mapping project, USGS staff at the Yosemite Field Station had transcribed the original data sheets and entered these data into an MS Access database. Because these data were derived from measurements of diameter and focused on trees and shrubs rather than on grasses and herbs, they were not as useful for full classification of vegetation as stands that contained information on important diagnostic herbaceous species. The locations of these data were entered using township, range, section, and quarter section coordinates. These locations were further entered as accurately as possible into the Yosemite National Park GIS system.

To make the data set more useful for classification algorithms, the tree, shrub, and existing herb data were converted from initial cover measurements to cover classes. Three cover classes were used. They are as follows:

- Cover class 1—from 1–5% cover
- Cover class 2—from 5–25% cover
- Cover class 3—greater than 25% cover

Natural Resources Inventory Data: From 1988 to 1993 NPS field crews established 362 permanently located plots throughout Yosemite National Park using a stratified random selection of classes in a classified satellite image to locate sample points. Only areas within the national park boundary were sampled. These data were originally collected to help validate a satellite-based vegetation map that was completed using 1930s data for floristic and satellite imagery for canopy density. Complete data on tree, shrub, and herbaceous species were collected. Information on tree, shrub, and herbaceous dominated layers was collected in different ways. Tree abundance was estimated using diameter breast height (DBH) measurements. Line intercept transects were used for shrub cover estimates, and small subplots located along transect lines were used for herbaceous cover. Appendix 2 contains the full instructions for this protocol. All data for these samples were entered into an MS Access database and converted to generalized cover classes. The cover classes for trees were based on algorithms for diameter and crown relationships (quadratic mean diameter models) for trees and cover classes for shrubs and herbs were based on the expansion of estimates of cover in transects and subplots. A three-point cover class system identical to the Wieslander (see above) was used to run the classification algorithms. In general the absolute cover values for trees tended to be low but were estimated to fall within the broad cover classes fairly reliably (P. Moore, pers. comm. 2000).

U.S. Forest Service Upland and Riparian Classification Plots: Don Potter, Southern Sierra Province ecologist for the U.S. Forest Service (located at Stanislaus National Forest, Sonora, California), collected a number of plots in the mapping environs that have not been formally analyzed and described in his publications (Potter, 1998). He shared these plot data with the classification team in addition to preliminary association descriptions and results from riparian data sets collected primarily in the central and southern Sierra. The plot data were collected based on 0.1-acre plots (400 m²) collected using standardized USFS methods (Allen, 1987). These included estimates of cover for all species of trees, shrubs, and herbs. These were broken into five cover classes that were based on the default settings of TWINSpan (Hill, 1979), which equate to

- Class I merely present–2%
- Class II > 2–5%
- Class III > 5–10%
- Class IV > 10–20%
- Class V > 20% cover

Approximately 159 of Potter's plots were used to help develop the preliminary classification. They included approximately 122 riparian and approximately 47 upland forested plots.

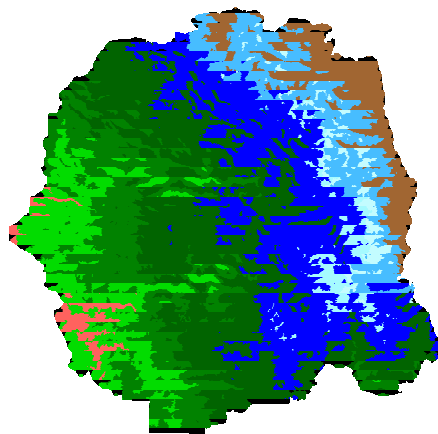
SAMPLE ALLOCATION AND THE DEVELOPMENT OF THE GRADSECT

To develop a vegetation map and classification specific to Yosemite National Park and environs, it was necessary to establish ecological plots to collect data for each vegetation type. The extreme size and varied terrain of the Yosemite region required carefully locating plots to efficiently capture the full spectrum of vegetation types. A gradsect analysis (Gillison and Brewer, 1985) utilizing spatial representations of the environmental variables associated with the region's vegetative diversity was used to help determine plot placement.

In May of 1997 a consortium of USGS, NPS, NatureServe, and California Heritage ecologists familiar with the vegetation of Yosemite chose the environmental variables most responsible for the region's vegetative diversity. These

environmental variables were then used to develop a spatial model predictive of potential vegetative diversity. The salient variables were determined to be slope, aspect, elevation, geology, hydrology, the east–west gradient in climate, and fire history. Suitable classes were determined for each of these variables. A 30-meter digital elevation model (DEM) of the park and environs was used to calculate the slope, aspect, and elevation grids. Park Service staff also provided coverages of the region's hydrology and geology. These coverages were converted into grids with the same cell size and reference coordinates as the DEM. All coverages and grids were in the UTM Zone 11 coordinate system, NAD27 datum. All coverages and grids were clipped to the boundary of the environs as provided by NPS staff. Each grid was then reclassified into the classes established by the ecologists. Fire history was available for the park but not available for the environs at the time of this analysis. The remaining five grids were combined to form the initial Biophysical Units (BPUs), which would be used to stratify sampling. A neighborhood analysis was performed on the Biophysical Unit grid to determine areas of high physical diversity. Each grid is briefly described below.

Elevation grid. The clipped DEM was reclassified according to the classes established by the ecologists. The classes were

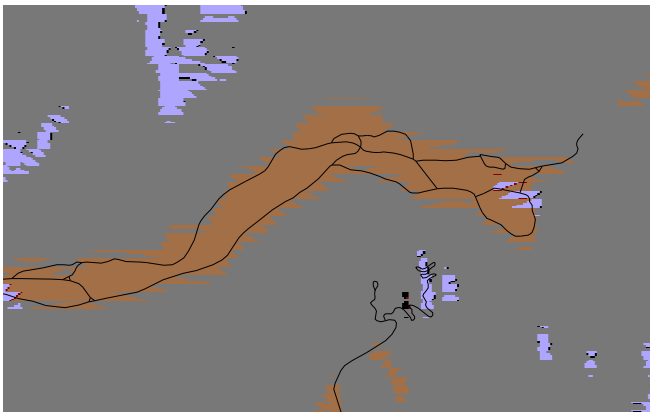


Shown is the elevation grid for the entire environs. The study area is approximately 90 km from north to south and 80 km from east to west.

West side < 3,000 feet	Gridcode = 1
West side 3,000–5,000 feet	Gridcode = 2
West side 5,000–7,000 feet	Gridcode = 3
West side 7,000–9,000 feet	Gridcode = 4
West side 9,000–11,000 feet	Gridcode = 5
West side > 11,000 feet	Gridcode = 6
East side 7,000–9,000 feet	Gridcode = 7
East side 9,000–11,000 feet	Gridcode = 8
East side > 11,000 feet	Gridcode = 9

Geology grid. The geology data were originally provided as a coverage export file by Park Service staff. The staff had attributed the map with the geologic classes the ecologists felt were important to vegetative diversity. The classes were

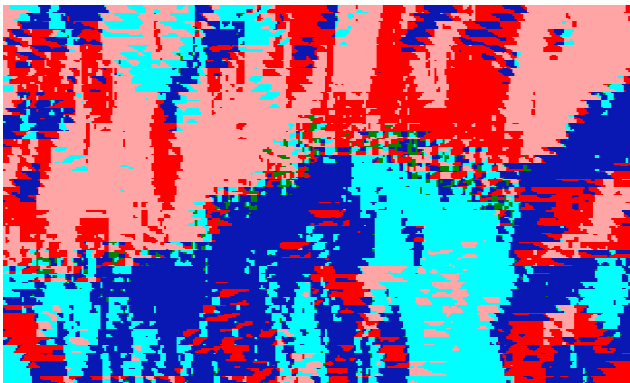
Plutonic	Gridcode = 10
Alluvium	Gridcode = 20
Morainal	Gridcode = 30
Metamorphic	Gridcode = 40
Volcanic	Gridcode = 50



This clip from the geology coverage shows granitic (in gray) rock surrounding the alluvium (in brown) of the Yosemite Valley floor. The blue areas are moraines. Roads have been added for reference.

Aspect grid. Again using the clipped DEM, aspect was calculated. The output of this process gives a value from 1–360 degrees, representing the compass bearing each cell faces. This grid was regrouped into five classes:

None (flat)	Gridcode = 100
Northeast	Gridcode = 200 (0–90°)
Southeast	Gridcode = 300 (91–180°)
Southwest	Gridcode = 400 (181–270°)
Northwest	Gridcode = 500 (271–359°)



Cooler slopes (north facing) are depicted in shades of blue, warmer (south facing) in red. Completely flat areas are shaded green.

Slope grid. The DEM was used to calculate slope in degrees. The 1997 BPU analysis grouped the slopes into three classes, and hydrology was treated as a separate grid. Prior to the 1998 field season, it was noted that riparian corridors were finely grained with individual cells of unique BPUs. The ecologists felt the riparian areas had been overstratified, and ways were discussed to adjust the BPUs to be a more accurate ecological model. Hydrology was redefined as an attribute of the slope. Slopes of 0 degrees adjacent to permanent water bodies were considered hydric, as were buffers of one cell surrounding water courses on slopes to 35 degrees. The final classes were

0–3° Hydric	Gridcode = 1,000
0–3° Nonhydric	Gridcode = 2,000
3–35° Hydric	Gridcode = 3,000
3–35° Nonhydric	Gridcode = 4,000
> 35°	Gridcode = 5,000

Access considerations. Prior to the 1998 field season, actual site selection began using the BPUs generated by the combination of these four grids. An initial attempt was made to use the results of a neighborhood analysis to select sites with a relatively diverse assemblage of BPUs within a one-mile radius. Comparing the results of this selection against USGS topographic maps revealed that proximity was not analogous with access. The slope, aspect, and elevation components of the biophysical analysis virtually assured that variability within a small area corresponded with

topographic extremes. Selection of sample sites based solely on this neighborhood analysis would have exposed the field crews to hazardous travel conditions.



This image of the Yosemite Valley shows the final BPUs. Each unique combination of slope, aspect, elevation, geology, hydrology, and fire history forms a polygon. Only 20 colors are used in this picture for ease of visual interpretation. There are approximately 75 BPU types within this area.

A second approach was developed using a terrain model of the park and environs. The DEM of the environs was utilized to calculate slope in degrees. An analysis mask was constructed by combining the arcs of all known roads, trails, and streams. Converting these arcs to a grid and reclassifying them as "No Data" values allowed the removal of cells containing roads, trails, and permanent water bodies from the slope grid. The resulting grid was again reclassified so all cells with the value of "No Data" (corresponding to the eventual locations of all roads, trails, and permanent water bodies) were changed to a value of "0." Cells with slopes of greater than 45 degrees were also changed to "0." The trails grid was classified so each trail cell had a value of "2," while nontrail cells had a value of "0." Using map algebra, the reclassified trail and slope grids were added together. The road grid was reclassified so each road cell had a value of "1," while nonroad cells had a value of "0." Map algebra was again used to subtract the reclassified road grid from the slope/trail grid. The resultant grid now contained values of "-1" for roads, "0" for streams and lakes, "1" for cells where a road crossed a trail, and "2" for trails. This grid was reclassified once more to convert "-1" cells to a value of "1" and cells valued at "0" to "No Data." This final cost surface values permanent water courses/bodies and dangerously steep slopes as "No Data" which is considered a barrier in subsequent path/cost analysis. All paved roads have a value of "1," and unpaved roads and trails have a value of "2." Bridges over streams are correctly valued "1" or "2," and all other cells are reclassified according to their slope, varying from "3" for flat to "45" for very steep slopes. Using this cost surface in a weighted-distance function with paved roads as the "source," each cell within the environs is assigned to the least accumulative cost path to the least costly source.

A weighted-distance function was then used to help determine plot placement for the 1998 field sampling season. Centroids were determined for each BPU larger than the minimum mapping unit (1/2 hectare). Centroids that fell outside the boundary of their parent polygon were projected back within the polygon. The cost was then calculated for travel from each centroid back along its least-cost path to the nearest road. Spatially joining the output of this calculation with the original BPU grid provided a table listing the cost associated with visiting any BPU. Ordering this table by BPU value, three polygons of each type with a low to moderate travel cost and divergent x,y coordinates were chosen. This subset of BPUs represented an accessible selection of each type dispersed over its range of distribution. Clustering of samples was not an overt selection criteria, but examination of the final spatial data set revealed that clustering had occurred with enough regularity to allow efficient sampling within any given geographic region.

The field coordinator would specify where phenology was approaching optimum sampling conditions. Maps of these areas were then produced for the field crews. Using USGS orthophoto quads and digital raster graphic topographic quads

as backdrops, maps and boundaries of the BPU subset were plotted at 1:12,000 scale. These maps were then used as navigational aids by the vegetation sampling crews. UTM coordinates for each BPU were given in a table printed on the map margin. A small graphic of the environs with the boundaries of the mapped area was also plotted on the margin.

Each ecological plot collected by the field crews was labeled with a coordinate from a global positioning system Precision Lightweight GPS Receiver (PLGR) or interpolated from the USGS topographic map when satellites were not visible. At the end of the field season these coordinates were aggregated with coordinates from previous sampling seasons.

1999 Methodology

The 1999 season was initiated with a meeting of the gradsect team, February 1–3. Prior to the meeting several data sets had been created or enhanced. A point coverage of all previous fieldwork within the environs had been assembled, and fire history had also been completed for the areas within the environs but outside the park boundary. Additional roads and trails had been added to the cost surface, and the slope classes had been modified to improve the travel cost analysis. The fire data was combined with the previous BPU component grids to yield the final BPU data set for the 1999 sampling season.

Interesting relationships were revealed when the 256 plots collected in 1998 were examined. Approximately 150 alliances or associations were sampled in the 145 unique types of BPUs that were visited. Three vegetation types had each received four samples; the remainder had received three or fewer. As many as 24 new, undocumented vegetation types were discovered. When compared with a sample allocation for the jointly mapped Golden Gate National Recreation Area (GGNRA) and Point Reyes National Seashore (PORE), which had been driven purely by photointerpretation, the biophysical analysis at Yosemite had done a much better job of stratifying samples across vegetation types. The initial photointerpretation attributes used to select samples in GGNRA–PORE were about 60 percent correct. Of the 134 samples collected in one season, two vegetation types had received 23 extraneous plots. Those 23 samples had been collected based on incorrect photointerpretation identifications. As a result, additional samples had to be taken to capture the types missed because of misidentification. By contrast, the BPU analysis had yielded near 100 percent efficiency, that is, every sample collected was needed for mapping and/or analysis. This was a result of increased efficiency in the identification of unique vegetation environments as well as a more efficient tracking of "minimum samples required" implemented by the Yosemite field crews.

Previous sampling within Yosemite and environs had not been quite as efficient. Including the 1998 samples, 1,608 ecological plots had been collected within the environs since the 1930s. Comparing the locations of all plots against the BPUs, only 622 BPU types had been sampled at least once. This left 775 BPU types to be examined. Time and funding constraints prohibited a field visit to each of these locations. However, combining photointerpretation with biophysical and cost surface analyses could effectively focus sampling on the types needed for mapping and classification.

Approximately 1,500 aerial photographs were required to cover the park and environs. These must all eventually be delineated and attributed. This work required more time than was available before the end of the field season. To finalize the vegetation sampling by the end of the 1999 field season, ecological sampling was targeted as a subset of the unsampled BPUs, which presented unknown signatures to the photointerpreters or known signatures that corresponded to types that needed additional samples for the classification.

The park and environs had been divided into eight ecological zones. Each ecological zone contains a relatively exclusive subset of vegetation types. The polygons of the cost distance coverage were spatially joined to each ecological zone subset of unsampled BPUs. Approximately three polygons of every BPU type were then selected based on travel costs and divergent x,y coordinates. A set of 30–50 photos were interpreted for each ecological zone based on the distribution of the selected BPUs. Two months before the sampling season, photointerpretation began for the first ecological zone. Photointerpretation was scheduled to precede the field crews' work in each ecological zone so they would have photos with delineated polygons to direct their sampling. The Oak/Chaparral Ecological zone (Zone I) was first, followed by the Red Fir Ecological zone (Zone III). Work then focused on the lower east slope and the Pinyon/Juniper Ecological zone (Zone VIII). Interpretation progressed steadily upslope as dictated by anticipated weather and phenology. The photointerpreters used previously collected plots from the ecological zone and their own field visits with ecologists to

train them to recognize distinct vegetation signatures. Unrecognizable signatures and types known to need additional samples for classification were targets of the field crews.

In the 1999 field season, the emphasis was on obtaining adequate samples for as many vegetation types as time allowed. Visiting unsampled BPUs was deemphasized because the photointerpreters were better able to direct the field crews to underrepresented vegetation types. It is still interesting to note the results of 1998 and 1999 field sampling in terms of BPUs visited. Two hundred seventy-two BPU types were visited in the 1998 and 1999 field seasons. Adding all other previously collected data sets (Wieslander, ground control plots, etc.) brought the total of sampled BPUs to 816 of 1,397. However, looking at the acreage of the mapping area corresponding with the sampled BPU types, roughly 85 percent of the park's surface area has been sampled. Of the 15 percent unsampled, the vast majority is composed of steep slopes (unsamplable), high elevation sites (probably snow fields or barren), roads, streams, and lakes. The unsampled BPUs, therefore, only correspond with about 1.5 percent of the mapping area's total surface area.

Other large parks and preserves may benefit from this type of analysis. If the physical parameters, which drive the diversity of the local vegetation, can be approximated with spatial data, sampling efficiency can be maximized. Those areas with the least amount of existing field data may reap the largest benefit. If vegetation sampling was driven from the beginning by biophysical and cost surface analysis, nearly every sample collected would be useful for mapping and/or classification. The time and effort invested in setting up the spatial analysis would be amply compensated by the efficiency of the field sampling effort.

FIELD DATA COLLECTION

A standardized field data collection protocol was developed in the spring of 1998 as a collaborative effort with the NatureServe senior ecologist and the ecologists for this project. This protocol was relevé based. Covers of trees, shrubs, and herbaceous species were estimated in plots of variable sizes based on the physiognomy of the vegetation. In general, herb-dominated plots in the patchy alpine and subalpine were 100 m² while scrub and riparian plots were 400 m², and large stands of wooded vegetation were sampled with 1,000 m² plots. A standard set of environmental variables was collected as part of each field sample. All plots were permanently located with markers using Department of Defense grade (PLGR, Rockwell–Collins, Cedar Rapids, Iowa) GPS receivers through a special arrangement for nonfederal access. A complete description of the field sampling protocol and the field data sheets and code lists are provided in Appendix 3. In addition to the vegetation and ecological data, two fuel protocols were undertaken at each sample point. These protocols are described in detail in Appendix 4. Fuels data were considered an essential value-added aspect of the field data collection and will be used to refine fuels modeling for the park.

The field crews who performed the data collection for the 1998 field season were trained in early June and through the months of June, July, and August 1998 collected 264 field plots. In the 1999 field season crews were trained in early May and collected data through the early part of September. In 1999 340 field plots were collected.

The members of the 1998 field crew were

Peter Warner—field team coordinator
Shannon Klohr—crew leader
Mishon Martin—crew leader
Jesse Grossman—data collector
Ryan Roberts—data collector

The members of the 1999 field crew were

Johanna Good—Field team coordinator

Shannon Klohr—crew leader
Cristian Singer—crew leader
Jesse Grossman—data collector
Ryan Roberts—data collector

ARCHIVING AND ANALYSIS OF DATA

The NatureServe–NPS PLOTS database, based on MS Access 2.0 software, was created by NatureServe in 1997 and was used to enter and archive all field data collected in the sampling seasons of 1998 and 1999. This database was developed specifically for the NPS mapping projects, and data entry mirrored the field forms used in the project (see Appendix 3 for field forms and field protocol). Data were entered by NatureServe contractors on-site in the summer of 1998 and by NatureServe staff at the Midwestern Resource Office in Minneapolis, Minnesota, following the 1999 field season. Data were quality controlled by NatureServe (NatureServe) ecologists in Minnesota. The plot numbers of the data sets were coded based on the year collected (98 or 99 prefix), the field team leader's last name (K = Klohr, S = Singer, M = Martin), and a number. For example, 99K125 would be the 125th field sample collected by the Klohr field crew in the 1999 field season. As mentioned previously, the Wieslander data set, the Potter data set, and the NRI data set all have been entered individually into Microsoft Access databases and/or Excel spreadsheets. These data sets are available through the California Vegetation Information System on record at the California Department of Fish and Game (contact Todd Keeler–Wolf). Photographs taken of each plot are archived with the original field forms at the Yosemite Field Station.

The analysis of plot data collected in 1998–1999 was undertaken using the PC-Ord software suite of ordination and classification tools (McCune and Mefford, 1997). PC-Ord allows disparate types of data to be fed directly into classification programs, such as TWINSpan (Hill, 1979) or Cluster Analysis (McCune and Mefford, 1997), whether entered in various spreadsheet, database, or condensed formats.

Following the 1998 field season 268 vegetation plots were available for analysis. The NPS project ecologist for NatureServe, Jim Drake, analyzed the first season's data and ran it through TWINSpan and Detrended Correspondence Analysis (DCA). This provided a general sense of the classification thus far and began to clarify the relationships of the plots. Following the 1999 field season, both sampling years were combined into a 604-sample data set. Jim Drake extracted the species by sample information from the PLOTS database and provided data matrixes to Todd Keeler–Wolf for the detailed analyses.

The classification analysis for all sampling data followed a standard process. First, all sample-by-species information was subjected to two basic TWINSpan runs. The first was based on presence/absence of species with no additional cover data considered. This provided a general impression of the relationships between all the groups based solely on species membership. The second was based on the standard default run where cover values are converted to the following five different classes:

Class I	merely present–2%
Class II	> 2–5%
Class III	> 5–10%
Class IV	> 10–20%
Class V	> 20% cover

These cover values are reasonable for most vegetation. The first three cover classes compose the majority of the species values. This second run demonstrated the modifications cover values can make on the group memberships. Depending on the size of the data set, the default runs were modified to show from six to 12 divisions (the largest data sets were subdivided more than the smaller data sets). A minimum group size of three was specified for all runs. The intent was to display the natural divisions at the finest level of classification (the association) rather than the alliance level.

Following each of these runs, consistent groupings were identified and compared. Following the identification of natural groups in TWINSpan, cluster analysis using Ward's scaling method and Euclidean Distance (McCune and Mefford, 1997) measure was employed for an agglomerative view of grouping as opposed to the divisive grouping in the TWINSpan algorithm. The congruence of groupings between TWINSpan and cluster analysis was generally close.

Disparities were resolved by reviewing the species composition of individual samples. Most of these uncertain plots either represented transitional forms of vegetation that could be thought of as borderline misclassified plots or outliers with no similar samples in the data set.

Because of the size of the data set, initial TWINSpan runs were made to help break the data into finer levels that were, in turn, reanalyzed using TWINSpan and cluster analysis. This process is known as progressive fragmentation (Bridgewater, 1989). The full data set was first analyzed together, then broken into distinct subsets and individually analyzed. Subsets included riparian shrub and tree-dominated plots, upland herbaceous plots, shrub-dominated plots, and nonriparian tree-dominated plots. An example of the cluster analysis of part of the 1998–1999 data set is shown in Table 2.

Following cluster analysis and TWINSpan analysis of all subsets of the primary new data set, each plot was revisited within the context of the cluster to which it had been assigned to quantitatively define the membership rules for each alliance. These membership rules were defined by species constancy and species cover values and were translated into a first-order plot-based classification.

The first-order classification was tested in the field during field visits in 1999–2001 and was refined into the key presented in this report.

This set of data collected throughout the mapping area was to be used as the principal means of defining the association composition throughout the mapping area. As a result, careful scrutiny of the membership of each grouping defined had to be employed to establish membership rules for all existing plot data and set the standard for the definition of the associations defined as one of the products of this report.

Table 2 is an example of cluster analysis for eastside grouping of 146 plots defined by constancy of *Artemisia tridentata*. Each differently colored group defines a distinct cluster of related samples at either the alliance or association or association group level. Breaks closest to the left side of the dendrogram show the most closely related plots.

<u>preliminary alliance classif</u>	<u>artr-putr 146 cluster analysis dendrogram</u>
Singleleaf pinyon (alliance) (1)	98K43
Singleleaf pinyon (alliance) (1)	98K44
Singleleaf pinyon (alliance) (1)	99S101
Singleleaf pinyon (alliance) (1)	99S89
Singleleaf pinyon (alliance) (1)	99S91
Singleleaf pinyon (alliance) (1)	99S92
Singleleaf pinyon (alliance) (1)	99S68
Singleleaf pinyon (alliance) (1)	99K63
Singleleaf pinyon (alliance) (1)	99K55
Singleleaf pinyon (alliance) (1)	99S100
Singleleaf pinyon (alliance) (1)	99S84
Singleleaf pinyon (alliance) (1)	99K61
Aspen (alliance) (2)	98K50
Aspen (alliance) (2)	99K97
Aspen (alliance) (2)	99S60
*****Jeffrey Pine/Aspen/Big sagebrush (undescribed e side assn)	98M43
Aspen (alliance) (2)	99S96
Aspen (alliance) (2)	99K98
Aspen (alliance) (2)	99S122
Tobacco brush (alliance)	98M54
Tobacco brush (alliance)	99K89
Tobacco brush (alliance)	99K74
Tobacco brush (alliance)	99K67
Tobacco brush (alliance)	99S66
Tobacco brush (alliance)	99S70
Bitterbrush (alliance) (1)	98K37
Bitterbrush (alliance) (1)	98M42
Big sagebrush-desert snowberry association (Taylor)	99K62
Big sagebrush-desert snowberry association (Taylor)	99S79
Big sagebrush-desert snowberry association (Taylor)	99S82
Bitterbrush (alliance) (1)	98M40
Bitterbrush (alliance) (1)	99K72
Big sagebrush-desert snowberry association (Taylor)	99S72

Bitterbrush (alliance) (1)	99S59								
Lodgepole pine/Big sagebrush association (Potter, 1998)	99K110	---							
Bitterbrush (alliance) (1)	99K68	-							
Bitterbrush (alliance) (1)	99K80	--							
Bitterbrush (alliance) (1)	99S58								
Bitterbrush (alliance) (1)	99S62								
Bitterbrush (alliance) (1)	99S63								
Aspen (alliance) (2)	98K48	-							
Aspen (alliance) (2)	99K54	- -----							
Aspen (alliance) (2)	99S78	--		-----					
*****Lodgepole pine/Aspen/Poa pratensis (undescribed eastside type)	99K57	-----							
*****Lodgepole pine/Aspen/Poa pratensis (undescribed eastside type)	99K85								

II. METHODS

In general the classification process followed these steps:

- a. Run outlier analysis on data, including subsets, to determine most distantly related plots.
- b. Run presence-absence TWINSpan to determine general arrangement of species along the gradient of axis 1 of DCA (both Reciprocal Averaging techniques of species-by-sample scores).
- c. Run different permutations of TWINSpan to see the general variation in arrangement of samples. Samples generally held together well and main gradient did not vary.
- d. Agree on the final representative TWINSpan run to use in the preliminary labeling.
- e. Determine the preliminary label alliance and association for each of the samples.
- f. Identify major break points (main divisions) in TWINSpan of full data set and subject major subsets of data to individual TWINSpan runs.
- g. Run cluster analysis (Ward's method) to test congruence with the subset TWINSpan groupings.
- h. Develop decision rules for each association and alliance based on conservative group membership possibilities based on review of species cover on a plot-by-plot basis.
- i. Use decision rules developed in the new data to assign vegetation names to all existing data.

Although outlier plots have a strong influence (plots that did not fit neatly into analysis groupings) on the arrangement of the main body of vegetation data, we decided not to remove them from the analysis. Although outliers were typically removed for additional analysis to clarify the main groupings of samples, they were considered as valid samples in the final enumeration and description of types. Because the sampling scheme tended to underrepresent the rare types, based on their rare bioenvironments, these relatively unique samples were considered important. They were often the only representatives of rare alliances defined from areas beyond the boundary of the study. In some cases they represented unusual species groupings heretofore undescribed and were viewed as affording perspective into unusual vegetation types that would deserve further sampling at some future date. These vegetation plots are also mentioned in the key and classification to alert users of the classification to their potential existence.

ANCILLARY DATA SETS

Analysis of the 754 Wieslander plots, the 362 National Resource Inventory (NRI) plots, and the 159 Potter plots followed a similar process to the one outlined above. Because each of these data sets used different sampling methodologies and assumptions, none of these sets were combined. Instead, each was analyzed separately. Following individual analysis of the data sets, the natural groupings were compared to the four data sets to look for congruence. For most types with full species data (all except Wieslander), there was generally no problem identifying the relationships between the data sets and assigning each plot to a unit in the refined classification based on the 604 1998–1999 plots classified using the GRADSECT sample allocation design.

In order of priority for developing the final classification, the 1998–1999 field data were weighted most heavily because they represented the best full-scale distribution of samples across the full spectrum of the area's bioenvironments. The NRI data were weighted second in importance because they also represented a fairly detailed perspective of samples throughout the National Park and contained information on all species. Potter's data were weighted next in importance because they were only representative of a portion of the vegetation of the mapping area, in spite of full representation of species. Wieslander data sets were weighted lowest in importance as they did not contain full species data for each plot and were skewed toward wooded vegetation. It must be noted that any vegetation types that are defined primarily through the analysis of the Wieslander data should be considered as somewhat generalized. Allen *et al.*, 1991 have described the classification units defined from the analysis of Wieslander plots as "subseries." In the National Vegetation Classification System (NVCS) terminology this would be translated as a level between alliance and association or informally, "suballiance." Most of the classification units defined by Wieslander data are wooded vegetation types in the subalpine zone including the *Pinus contorta* var. *murrayana* alliance, the *Pinus albicaulis* alliance, and the *Tsuga mertensiana* alliance. Thus, it may be expected that further plot data will be required to clarify association-level differences in these types within the study area.

CLASSIFICATION AND KEYS

The classification included here is based on the standard hierarchy of the U.S. National Vegetation Classification as supported by NatureServe (see www.natureserve.org). A conservative approach was taken to the formation and other

upper levels of the classification and in keeping with current revisions of the national hierarchy. A modal formation for an alliance was selected rather than developing multiple formations and alliances for groups such as hydrologic variations or variations in crown density, which may force an otherwise ecologically homogeneous alliance into multiple alliances or formations.

The vegetation key is written from two perspectives: (1) a field team attempting to identify vegetation or (2) an office team attempting to place field collected accuracy assessment samples into the proper category. Thus, heavy reliance is placed on correct identification of characteristic plant species and of proper estimation of vegetation cover of these species (see Instructions for Following Key in Section III. Results: Classification and Key) for specific instructions and definitions of terms used).

DESCRIPTION WRITING

Following the analysis of the plot data and the development of the key and classification, descriptions were written using the currently available template provided by NatureServe. The two primary writers were Michael Schindel (NatureServe–Oregon Field Office) and Sau San (California Native Plant Society). Diana Hickson (NatureServe) wrote several descriptions. Todd Keeler–Wolf (California Heritage) also wrote several descriptions and edited all of the descriptions.

When writing the descriptions the following standards were set.

Characteristic/Diagnostic species must be in at least 80 percent of the plots.

Minimum sample size for description $n = 3$. Descriptions of associations with fewer than three samples were attempted if (a) the association was sampled and described by previous authors or (b) the vegetation was confirmed as distinctive and repeatable based on field reconnaissance or by photointerpretation signature.

Abundant species: Species that were present on at least 50 percent of the plots at an average of at least 30 percent relative cover on all plots.

III. RESULTS: CLASSIFICATION AND KEY

The associations in the final classification are listed below. Each is titled with the association name and includes an author if the association has been defined prior to this report. It also includes a sample size based on the number of samples collected in this report used to develop the description. Sample plot numbers are indicated using the following protocol: All 1998 and 1999 field data have a format such as "99K22" or "98M100" and are listed first. NRI data are listed second in regular font. Plots from the Wieslander data set are listed third and are in bold, italic, underlined font, and plots from the Potter data set are always last in a list and are a 4-digit code such as "2045".

There were 105 new associations defined using data collected and analyzed during the course of this project. These are indicated with the statement "new association defined with data from this project" following the name and sample size in the classification list. Of these types 57 were represented with less than 10 plots and are therefore considered tentative and will require further field data. These are also indicated in parentheses following the name of the association. A further 48 preliminary units were sampled with less than three plots and may suggest other possible associations that require further sampling before they can be validated. These are also indicated in the classification list.

CLASSIFICATION OF VEGETATION OF YOSEMITE NATIONAL PARK AND ENVIRONS BASED ON THE NATIONAL VEGETATION CLASSIFICATION HIERARCHY Classification Version June 14, 2001 (with minor modifications in 2003)

DICHOTOMOUS KEY TO YOSEMITE ALLIANCES AND ASSOCIATIONS BASED ON FLORISTICS June 21, 2002 Version

Instructions for following key: This is not a strictly dichotomous key. Due to the diversity of vegetation in the mapping area and to avoid an excessively long document, I did not develop a series of couplets for each option. Instead, I have identified a set of characteristics with choices beneath each of these. The key will first lead the user to the general options, and the individual selections for the vegetation associations will be listed beneath these options. To arrive at the correct choice, simply work through the numbered list of types that lead you from the more general to the most specific options until the best fit is reached. Each of the choices is identified by a combination of alphanumeric codes, using numerals, capital letters, lowercase letters, and decimal points to distinguish different key levels. The most basic general levels in the key are on the left side of the alphanumeric code, and the most specific are on the right side. The coding system for each item in the key relates to a series of left indentations. Thus, by training your eyes down the left-hand side of the pages, you will note the major groupings and nested within them the subgroupings that will lead you to the correct answer. The preliminary key will direct you to the major groups, such as forest/woodland, shrubland, and herbaceous, with the more specific choice beneath them. The more specific lists within these are generally based on presence/absence or dominance/subordinance of significant species until you arrive at the optimum choice. Important: SINCE THERE MAY BE MORE THAN TWO ALTERNATIVES IN A GROUP, BE SURE TO WORK THROUGH ALL OF THE OPTIONS IN A LIST BEFORE YOU DECIDE WHAT IS THE BEST CHOICE FOR YOUR STAND.

Woodlands versus forest: Because many Yosemite tree-dominated alliances range from forest to woodland or even sparsely wooded shrubland or herbland, I have included keys to both forest and woodland segments under 100A Evergreen forest and 100B Winter deciduous forests and woodlands.

Adherence to the National Vegetation Classification System: The reality of ecological relationships in vegetation often blurs the predetermined decision rules differentiating forest, woodland, scrub, dwarf scrub, and other categories in the national classification. As a result, I have maintained the national rules for cover thresholds in the main keys but have chosen to identify the alliances and the associations within them by their ecological relatedness rather than strictly physiognomic criteria. To have flexibility, I have included potentially misinterpreted vegetation types in other possible locations in the key.

There is a broad conceptual gap between the floristic units of classification at the lower end of the NVCS hierarchy and the physiognomic units at the middle and upper levels of the national classification. There is no simple way to address this disconnection. If we rely on classification analysis of floristic units of vegetation (species cover and presence) to drive the classification, there should be only the results of that analysis to determine the middle and upper levels.

DEFINITIONS

Cutoff Values: The absolute percentages of species cover used for threshold values in the definition of types are generally derived from the TWINSpan pseudospecies cutoff values. For the NRI and the Wieslander data these cutoffs were: present—5 percent, greater than 5 percent—25 percent, and greater than 25 percent cover. For the 1998–1999 data the cutoffs used were: present—less than 1 percent, 1 percent–5 percent, greater than 5 percent–10 percent, greater than 10 percent–20 percent, and greater than 20 percent absolute cover. Thus, specific rules assigned to certain vegetation types are largely based on the principal data set(s) used to define them. If multiple data sets were used for the definition, then common cutoffs (5% and 25%) were used.

Dominance (dominated, dominant, strongly dominated by): This term refers to the preponderance of the vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual plant (as in dominated by *Pinus contorta* var. *murrayana*, or it may refer to dominance by a physiognomic type as in "stand dominated by shrubs." In the strict sense, dominance refers to the relative cover of one species or physiognomic type as compared to another species or physiognomic type. Anything over 50 percent relative cover is said to dominate a stand. Those species or physiognomic types that do not strongly dominate (considered to be 60% or greater relative cover) are treated in alternate keys so precise estimation is not necessary to arrive at the correct determination in the key.

Importance (important): A species is considered "important" in a stand or a vegetation type if it is greater than 1 percent absolute cover. However, in general, importance is a relative term with the proportion of the important species contrasted to the total cover of all species in the same layer. If there is a specific relative percentage identified for a vegetation type then it is mentioned in the key. This term is usually contrasted with "dominant" to mean that the species referenced is always present in the vegetation and always greater than 1 percent cover but not always dominant (> 50% relative cover).

Open: This is the term ascribed to individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is generally less than 30 percent absolute cover.

Intermittent: This is the term ascribed to individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is generally between about 30 percent and 60 percent absolute cover.

Continuous: This is the term ascribed to individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is generally greater than 60 percent absolute cover.

Conspicuous: Statements containing "conspicuous" are relative in meaning. For example, "conspicuous in canopy" means that in every stand a "conspicuous" species should be easily observed without a thorough searching of the stand. This is in contrast with "**inconspicuous**," which implies that although the species may be present, it is not usually easily found without a thorough search of the stand. A conspicuous species is not necessarily dominant, but it is "important" (at least 1% cover).

Relative cover: This term means the amount of the surface of the plot or stand sampled that is covered by one species (or physiognomic group) as compared to (relative to) the amount of surface of the plot or stand covered by all species or groups. Thus, 50 percent relative cover means that half of the total cover of all species or physiognomic groups is

composed of the single species or group in question. Relative cover values are proportional numbers and, if added, total 100 percent for each stand (plot sample).

Absolute cover: This is the actual percentage of the ground (surface of the plot or stand) that is covered by a species or group of species, for example, *Pinus ponderosa* covers between 5 percent and 10 percent of the stand. Absolute cover of all species or groups if added in a stand or plot may total greater or less than 100 percent because it is not a proportional number.

Shrubs: A shrub is a multistemmed woody plant that is between 0.2 meters and 5 meters tall. Definitions are blurred at the low and the high ends of the height scales. Small multistemmed trees approximately 4 meters tall and large woody herbaceous species less than 0.5 meters tall are individually treated in the keys and distinguished from shrubs.

Subshrubs: Subshrubs are considered multistemmed woody plants less than 0.5 meter tall on average.

Sparse: This is a generic term relating to low widely spaced cover of individuals of a species or physiognomic group. Sparsely vegetated is defined as less than 2 percent cover of vegetation, sparse canopy is less than 10 percent (see Emergent).

Stand: A stand is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small such as alpine meadow or tundra types, and some may be several square kilometers in size such as desert or forest types. A stand is defined by two main unifying characteristics.

1. It has *compositional* integrity. Throughout the site, the combination of species is similar. The stand is differentiated from adjacent stands by a discernable boundary that may be abrupt or gradual.
2. It has *structural* integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes, but not the lower, would be divided into two stands. Likewise, a sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The structural and compositional features of a stand are often combined into a term called *homogeneity*. For an area of vegetated ground to meet the requirements of a stand, it must be homogeneous.

Emergent: This is a structural layer of vegetation that rises above the main canopy layer. It may be large trees over mid-sized or short trees, or large shrubs over denser subshrubs or herbaceous layers. Generally emergents are less than 10 percent absolute cover and are underlain by a denser subcanopy or understory.

Woody plant: This is any species of plant that has noticeably woody stems. It does not include herbaceous species with woody underground portions such as tubers, roots, or rhizomes.

Forest: In the National Vegetation Classification, a forest is defined as a tree-dominated stand of vegetation with 60 percent or greater cover of trees.

Woodland: In the National Vegetation Classification, a woodland is defined as a tree-dominated stand of vegetation with between 25 percent and 60 percent cover of trees.

Sparsely wooded: There are stands with trees conspicuous, but less than 25 percent cover may occur over shrubs as the dominant canopy (sparsely wooded shrubland) or herbaceous cover (sparsely wooded herbaceous).

West side: This refers to the area of the mapping project and the plant species west of the Sierra Crest.

East side: This refers to the area of the mapping project and the plant species east of the Sierra Crest.

Ecological Zones : See definitions in the beginning of this report, but brief definitions are as follows:

Zone I: Westside foothill oak woodland and chaparral
 Zone II: Westside ponderosa pine and black oak belt
 Zone III: Westside white fir and red fir belt
 Zone IV: Westside subalpine belt
 Zone V: Westside alpine belt
 Zone VI: Eastside alpine belt
 Zone VII: Eastside subalpine belt
 Zone VIII: Eastside pinyon pine and sagebrush belt

Key to Main Vegetation Divisions

I. Trees (at least 4 meters tall) evenly distributed and conspicuous throughout stand. In areas where vegetation covers greater than ca. 20 percent, tree canopy may be as low as 10 percent over denser subcanopies of shrub and herbaceous species. In areas where vegetation is less than 20 percent total cover, trees may cover less than 10 percent, but are at least 50 percent relative cover and evenly distributed across the stand = **Division 100, Tree Vegetation**

II. Vegetation dominated by woody shrubs or subshrubs. When total vegetation cover is over ca. 20 percent trees, if present, generally less than 10 percent cover in stand, herbaceous species may total higher cover than shrubs but are shorter in stature. Shrubs are always at least 10 percent cover. In areas where vegetation is less than 20 percent total cover, shrubs may cover less than 10 percent but are at least 50 percent relative cover and evenly distributed across the stand = **Division 200, Shrub Vegetation**

III. Vegetation dominated by nonwoody herbaceous species including grasses, graminoids, and broad-leaved herbaceous species. When total vegetation cover is greater than ca. 20 percent, shrub and subshrub species and trees, if present, of lower cover than herbs and less than 10 percent. If total vegetation cover is less than ca. 20 percent, shrubs, subshrubs, and/or trees may be present but are less than 50 percent relative cover with herbaceous species predominating = **Division 300, Herbaceous Vegetation**

IV. Total plant cover generally less than 2 percent includes boulder, gravel, cobble, or talus sparse vegetation. Sparsely vegetated sand accumulations, high mountain talus/scree, intermittently flooded mudflats, and recent soil slumps or landslides = **Division 400, Sparsely Vegetated to Nonvegetated**. Not specifically treated further in this key.

DIVISION 100: VEGETATION CHARACTERIZED BY TREES 100 Three main groups are individuated in the key: evergreen forests and woodlands, deciduous forests and woodlands, and mixed evergreen and deciduous forests and woodlands.

100A Evergreen forest. Evergreen species generally contribute greater than 75 percent of the total (relative) tree cover. Most alliances are modally considered forest, but canopy cover of trees may range down into woodland (25%–60% tree cover), or even sparsely wooded shrubland or herbaceous (< 25% cover of trees) class for some alliances.

100A.1 Canopy usually dominated by sclerophyllous broad-leaved evergreen species. Occasionally, conifers and broad-leaved evergreen species are codominant, but usually the conifers form a more open emergent layer over a denser canopy of broad-leaved trees.

100A.1A Canopy typically with greater than 50 percent relative cover of *Quercus chrysolepis* (canyon live oak) sometimes with emergent conifers I.A.6.N.b.2 = **QUERCUS CHRYSOLEPIS FOREST ALLIANCE**

100A.1Aa *Umbellularia californica* (California bay) present in stand; usually moderate to steep rocky slopes, often concave; the shrub *Keckiella antirrhinoides* frequently ($\geq 50\%$ of plots) present in the understory; *Toxicodendron diversilobum* (poison oak) present in virtually all plots may include up to 25 percent cover of California black oak (*Quercus kelloggii*) in tree layer = **Canyon live oak-California bay/(keckiella) Forest [*Quercus chrysolepis*-*Umbellularia californica*/(*Keckiella antirrhinoides*) Forest] (n=20)**

100A.1Ab *Umbellularia californica* may or may not be present; typically steep northerly slopes; *Dryopteris arguta* (California wood fern) present in understory = **Canyon live oak/Wood fern Forest [*Quercus chrysolepis*/*Dryopteris arguta* Forest] (n=4)**

100A.1Ac *Arctostaphylos viscida* (whiteleaf manzanita) a conspicuous (from 2%–50% cover) understory shrub = **Canyon live oak/Whiteleaf manzanita Forest [*Quercus chrysolepis*/*Arctostaphylos viscida* Forest] (n=17)**

100A.1Ad *Arctostaphylos patula* (greenleaf manzanita) present as principal understory shrub; *Q. chrysolepis* may be shrubby = **Canyon live oak/Greenleaf manzanita Forest [*Quercus chrysolepis*/*Arctostaphylos patula* Forest] (n=5)**

100A.1Ae *Pinus sabiniana* (foothill pine) forms a usually sparse emergent overstory over an open to continuous canopy of *Q. chrysolepis*. Total tree cover may cross the boundary of forest/woodland cover; shallow rocky soil commonly with outcrops of bedrock = **Canyon live oak-Foothill pine Forest [*Quercus chrysolepis*-*Pinus sabiniana* Forest] (n=8)**

100A.1Af *Pinus ponderosa* (ponderosa pine) forms a usually sparse emergent overstory over intermittent to continuous canopy of *Q. chrysolepis* = **Canyon live oak-Ponderosa pine Forest [*Quercus chrysolepis*-*Pinus ponderosa* Forest] (n=3)**

100A.1Ag *Calocedrus decurrens* (incense cedar) may form emergent layer or be present in main canopy with *Quercus chrysolepis*; typically riparian or semiriparian lower slope settings = **Canyon live oak -Incense cedar Forest [*Quercus chrysolepis*-*Calocedrus decurrens* Forest] (n=3)**

100A.1B Another oak or broad-leaved evergreen tree dominant; either *Quercus wislizeni* (interior live oak), *Cercocarpus ledifolius* (curlleaf mountain mahogany) or *Cercocarpus betuloides* (birchleaf mountain mahogany). All of these species may take shrub or tree forms depending on disturbance history, site productivity, and other factors.

100A.1Ba Canopy dominated by the small tree or large shrub, *Cercocarpus ledifolius*. Occurs principally in ecological Zones VII and VIII on the east side of the crest on steep rocky sites; associated with *Artemisia tridentata* (big sage) and other Great Basin species = **II.A.5.N.a.1 CERCOCARPUS LEDIFOLIUS WOODLAND ALLIANCE**. Note: Stands vary. Although most fall into woodland with less than 60 percent canopy cover, there are two unclassifiable plots characterized by high canopy cover. Only one association defined locally with *Symphoricarpos rotundifolius* (round-leaved snowberry) as the characteristic understory species:

Curleaf mountain mahogany/Roundleaf snowberry Woodland [*Cercocarpus ledifolius*/*Symphoricarpos rotundifolius* Woodland] (n=8)

100A.1Bb A short woodland or tall scrub of the west side of the Sierra Crest in ecological Zones I and II with *Cercocarpus montanus* (*C. betuloides*, Hickman 1993) as the dominant overstory species; may mix with lesser cover of other chaparral shrubs including *Arctostaphylos viscida* and *Ceanothus cuneatus* = **II.A.5.N.a.2 CERCOCARPUS MONTANUS (*C. betuloides*, Hickman, 1993) WOODLAND ALLIANCE**

Only one association formally identified with *Cercocarpus montanus* forming a moderately dense canopy over sparse shrub and sparse herbaceous layers = **Birch-leaf mountain mahogany Woodland [*Cercocarpus betuloides* var. *betuloides* Woodland] (n=5)**

100A.1Bc Interior live oak (*Quercus wislizeni*) dominant or important in the canopy, if not dominant, *Q. wislizeni* may share dominance with *Q. chrysolepis* (canyon live oak) = **II.A.5.N.a.6 QUERCUS WISLIZENI WOODLAND ALLIANCE**

100A.1Bc.1 Either interior live oak or canyon live oak may dominate the canopy, but both are important (> 30% relative cover). Stands are typically in low slope or ravine settings in ecological Zone I = **Interior live oak-Canyon live oak Woodland [*Quercus wislizeni*-*Quercus chrysolepis* Woodland] (n=3)**

100A.1Bc.2 *Q. wislizeni* is the sole dominant tree with the large shrub *Arctostaphylos viscida* (whiteleaf manzanita) as the understory indicator; there may be substantial grass in the herb layer = **Interior live oak-Whiteleaf manzanita Woodland [*Quercus wislizeni*-*Arctostaphylos viscida* Woodland] (Allen et al., 1991) [n=2]**

100A.1Bc.3 Dominated by *Quercus wislizeni* in the overstory, *Pinus sabiniana* and *Quercus douglasii* are less cover, but important or conspicuous = **Interior live oak-Blue oak-Foothill pine/Brome-Wild carrot Woodland [*Quercus wislizeni*-*Quercus douglasii*-*Pinus sabiniana*/Bromus sp.-*Daucus pusillus* Woodland] (Allen et al., 1991)**

100A.2 Canopy dominated by needle-leaved or scale-leaved coniferous trees

100A.2A Emergent layer or canopy of *Sequoiadendron giganteum* present, typically over denser canopy or subcanopy of other conifers. *S. giganteum* must at least occur as a regular emergent and not as an isolated single tree to fit definition = **I.A.8.N.a.1 SEQUOIADENDRON GIGANTEUM FOREST ALLIANCE**

100A.2Aa *S. giganteum* emergent over second tier of conifers with sugar pine present and a subcanopy containing *Cornus nuttalli* (Pacific dogwood), includes all major stands of alliance in area = **Giant sequoia-Sugar pine/Pacific dogwood Forest [*Sequoiadendron giganteum*-*Pinus lambertiana*/Cornus nuttalli Forest] (n=11)**

100A.2B No emergent *Sequoiadendron*, canopy composed of needle-leaved conifers with rounded or conical crowns; may include relatively open woodlands and denser forest types

100A.2Ba Pines (*Pinus* spp.) are the dominant and/or one of the characteristic conifer species of the tree canopy forming forests, woodlands, or sparsely wooded stands. Some stands may

be mixed with scale-leaved conifers, deciduous and/or broad-leaved evergreen tree species. However, pines are always conspicuous. (Note: This is a long list of nine individual pine groups; those not familiar with the flora should work through the list to eliminate all possibilities.)

100A.2Ba.1 *Pinus contorta* ssp. *murrayana* (Sierra lodgepole pine) dominates or is an important constituent of canopy; usually greater than 50 percent relative canopy cover, but it may mix with *Pinus albicaulis* (whitebark pine) in subalpine stands where either species may be dominant (see Lodgepole pine-Whitebark pine/Ross sedge Forest). (Also see Aspen-lodgepole pine/Big sagebrush/Kentucky bluegrass Forest of *Populus tremuloides* alliance and *Tsuga mertensiana* Forest Alliance where *Tsuga* >30% relative cover.) = **I.A.8.N.b.4 PINUS CONTORTA FOREST ALLIANCE.**

100A.2 Ba.1a *Pinus albicaulis* (whitebark pine) important in canopy or shrub layer, shrubs usually at less than 50 percent relative cover (if greater than 50%, see *Pinus albicaulis* Woodland Alliance), typically sparse herbaceous species sparse to moderate cover.

100A.2Ba.1a.1 *Carex rossii* (Ross sedge) present in understory in at least 1 percent cover, typically intermittent to well developed forest cover in subalpine uplands, *Carex exserta* (shorthair sedge) absent or inconspicuous and of lower relative cover than *Carex rossii* = **Lodgepole pine-Whitebark pine/Ross sedge Forest [*Pinus contorta* var. *murrayana*-*Pinus albicaulis*/*Carex rossii* Forest (n=32)**

100A.2Ba.1a.2 *P. contorta* and *P. albicaulis* may be more commonly considered to be forming a woodland than a forest; *Carex exserta* (shorthair sedge) conspicuous, generally on more open rocky stands than above or slopes with at least some fine grained substrate such as decomposed granite. Few samples, but consistently seen in field visits = **Lodgepole pine-Whitebark pine/Shorthair sedge Forest [*Pinus contorta* var. *murrayana*-*Pinus albicaulis*/*Carex exserta* Forest] (n=2)**

100A.2Ba.1b. Understory well developed with herbaceous and/or mesic shrub or subshrub species; *Pinus albicaulis* not important in canopy.

100A.2Ba.1b.1. *Populus tremuloides* (aspen) important or even marginally dominant in stands, usually mesic understory including *Poa pratensis* and scattered *Artemisia tridentata*. Eastside meadows and low gradient creek banks = **Aspen-Lodgepole pine/Big sagebrush/Kentucky bluegrass Forest [*Populus tremuloides*-*Pinus contorta*/*Artemisia tridentata*/*Poa pratensis* Forest] (n=4) of the *Populus tremuloides* Forest Alliance**

100A.2Ba.1b.2. A type of mesic to subhydric conditions; edges of streams or seepages. Canopy cover generally intermittent to continuous; the shrub *Ledum* (*Rhododendron*) *glandulosum* present and usually conspicuous in understory. *Vaccinium uliginosum* (bog blueberry) may be present = **Lodgepole pine/Western Labrador tea Forest [*Pinus contorta* var. *murrayana*/*Ledum glandulosum* Forest] (Taylor, 1984 and Potter 2000 ms) (n=6)**

100A.2Ba.1b.3 In similar conditions to above, but usually somewhat drier and less productive sites on lower slopes or meadow edges, stands usually open to intermittent; *Ledum glandulosum* absent or inconspicuous in understory, *Vaccinium uliginosum* conspicuous creeping subshrub = **Lodgepole pine/Western blueberry Forest [*Pinus contorta* var. *murrayana*/*Vaccinium uliginosum* Forest] (n=4)**

100A.2Ba.1b.4 Mesic herbaceous understory usually moderately to well developed; *Ligusticum grayi* (Gray lovage) present, other above species absent or inconspicuous; *Thalictrum fendleri* (Fendler's meadow rue), *Perideridia parishii* (Parish's yampah), *Trifolium* sp. (clover), and other herbs may be common, lower slopes, meadow edges, canopy usually greater than 50 percent cover = **Lodgepole pine/Gray lovage Forest [*Pinus contorta* var. *murrayana*/*Ligusticum grayi* Forest] (Potter, 1998) (n=26)**

100A.2Ba.1c Understory with either xerophytic shrubs or poorly developed with scattered herbs and shrubs except for the first association listed (100A.2Ba.1c.1); *Pinus contorta* usually in open or even sparse stands

100A.2Ba.1c.1 *Pinus contorta* forms intermittent to continuous canopy (generally > 50% cover) over sparsely developed understory (< 10%), with no species characteristic. *Abies magnifica* (red fir) is present in canopy and understory. Note: This is part of Potter's (1998) description. Because he did not sample the full range of variability of *Pinus contorta* woodland and forest, we restrict this definition to include stands with at least 1 percent *Abies magnifica*. This would equate to the lower and warmer stands of lodgepole pine where the tree absolute cover is greater than 35 percent, widespread on slopes and flats with few rock outcrops = **Lodgepole pine Forest [*Pinus contorta* var. *murrayana* Forest] (Potter, 1998 in part) (n=29)**

100A.2Ba.1c.2 *Artemisia tridentata* (primarily ssp. *vaseyana*) conspicuous in understory, tree canopy generally intermittent to open, may be on east side or west side, may have *Pinus jeffreyi*, *Abies magnifica* in moderate cover, generally of middle or lower slopes = **Lodgepole pine/Big sagebrush Forest [*Pinus contorta* var. *murrayana*/*Artemisia tridentata* Forest] (Potter, 1998) (n=2)**

100A.2Ba.1c.3 *Pinus contorta* var. *murrayana* forms open stands (> 10% and < 50% absolute tree cover), with sparse herbaceous and shrub understory. *Carex exserta* (shorthair sedge), if present, less than 5 percent absolute cover. Substrate is rocky with frequent outcrops and poorly developed soil. Note: This is part of Potter's (1998) description. Because he did not sample the full range of variability of *Pinus contorta* woodland and forest, we restrict this

definition to include stands with at least 1 percent *Abies magnifica*, and/or stands that do not have a significant *Carex exserta* understory. NRI data suggests this is a heterogeneous lot with some plots fitting into Potter's *P. contorta* woodland and others representing a higher elevation form not included in the original Potter sample array = **Lodgepole pine Woodland (Potter, 1998 in part) (n=22)**

100A.2Ba.1c.4 *Pinus contorta* var. *murrayana* conspicuous emergent tree or shrubby krummholz over scattered herbaceous understory with mountain pride penstemon (*Penstemon newberryi* ssp. *berryi*), or other rock outcrop species such as *Streptanthus tortuosus*, *Holodiscus discolor*, or *Spiraea densiflora*) usually rocky outcrops with poor soil development. Trees usually greater than 2 percent and less than 10 percent absolute cover = **Lodgepole pine /Mountain pride penstemon open Woodland [*Pinus contorta* var. *murrayana*/Penstemon newberryi Forest] (n=5)**

100A.2Ba.1c.5 Intermittent to continuous cover of *P. contorta* ssp. *murrayana* over relatively sparse to moderate, largely herbaceous understory with *Carex rossii* present and characteristic, generally of upland and slopes. Note: This is analogous to the upward extension of Potter's (1998) Lodgepole pine forest (see above) where *Abies magnifica* is not present = **Lodgepole pine/Ross sedge Forest [*Pinus contorta* var. *murrayana*/Carex rossii Forest] (n=4)**

100A.2Ba.1c.6 Open to intermittent cover of *P. contorta* over variable sparse to moderate cover of *Carex exserta* (shorthair sedge) generally covers greater than 5 percent of the understory. May occur in slightly moister and lower slope position than previous *P. contorta*/Carex rossii Forest, but also may be on upper slopes in settings with intermittent rock outcrops and gravelly benches and slopes, where *C. exserta* may colonize = **Lodgepole pine/Shorthair sedge Forest [*Pinus contorta* var. *murrayana*/Carex exserta Forest] (n=5)**

100A.2Ba.2 Vegetation primarily of subalpine Zone IV. *Pinus albicaulis* (whitebark pine) either dominant or conspicuous species in the canopy. May have *Tsuga mertensiana* in similar cover; *P. contorta* may be present in low cover (usually <1%), generally open to intermittent cover of trees = **II.A.4.N.a.33 PINUS ALBICAULIS WOODLAND ALLIANCE**

These associations are arranged in order from mesic to xeric.

100A.2Ba.2a An open to intermittent woodland association of high elevation snow accumulation sites usually below ridgelines and upper slopes on northerly exposures (may occur in sheltered microclimates on southerly exposures). Always has *Tsuga mertensiana* greater than 1 percent, though cover is variable, sometimes patchy; either species may dominate, may have some *Pinus contorta*, though generally less important than the other two conifers. This category includes all mixes of *P. albicaulis* and *T. mertensiana*, where both species are conspicuous = **Whitebark pine-Mountain hemlock Forest [*Pinus albicaulis* Tsuga mertensiana Forest] (n=28)**

100A.2Ba.2b Generally on gradual slopes at mid or lower positions adjacent to meadows and bench/rock outcrop systems, *Tsuga mertensiana* absent or inconspicuous, trees may be krummholz or erect = **Whitebark pine/Shorthair sedge Woodland** [*Pinus albicaulis*/*Carex exserta* Woodland] (n=9)

100A.2Ba.2c *P. albicaulis* forms woodland or forest on lower to mid slopes, generally not krummholz; *Carex rossii* one of the few constant understory species but may be sparse; *Poa wheeleri* may be present = **Whitebark pine/Ross sedge Woodland** [*Pinus albicaulis*/*Carex rossii* Woodland] (n=5)

100A.2Ba.2e Xeric rocky upper slope krummholz association with scattered or clumped *Pinus albicaulis* over a sparse understory including *Penstemon davidsonii*. This is the standard tree line association in much of the study area. *P. davidsonii* is generally in low cover and only in rockier more sheltered settings, further sampling required to clarify other potential tree line associations = **Whitebark pine/Davidson's penstemon Woodland** [*Pinus albicaulis*/*Penstemon davidsonii* Woodland] (Taylor, 1984) (n=2)

100A.2Ba.3 Vegetation of chaparral and oak woodland Zone I stands dominated by *Pinus attenuata* (knobcone pine) in the tree layer, may have dense chaparral shrub understory, stands usually on upper slopes and ridgelines = **II.A.4.N.a.10 PINUS ATTENUATA WOODLAND ALLIANCE**

100A.2Ba.3a *Pinus attenuata* forms open to relatively dense canopy over *Adenostoma fasciculatum* (chamise). No plots but repeatable, clearly identifiable signature in photos, may include *Ceanothus cuneatus* (wedgeleaf ceanothus) = **Knobcone pine/Chamise Woodland** [*Pinus attenuata*/*Adenostoma fasciculatum* Woodland]

100A.2Ba.3b *Pinus attenuata* forms open to relatively dense canopy over *Arctostaphylos viscida* = **Knobcone pine/Whiteleaf manzanita Woodland** [*Pinus attenuata*/*Arctostaphylos viscida* Woodland] (n=3)

100A.2Ba.3c *Pinus attenuata* shares canopy with *Quercus chrysolepis* tends to be on upper n facing slopes in zone 2. (n=0)

100A.2Ba.4 *Pinus flexilis* (limber pine) dominant canopy tree. May form open woodlands or krummholz. Only locally known from Zone VII above Lundy Canyon, above Agnew Lake in the Rush Creek drainage, high on the south wall of Buckeye Canyon, and near Ellery Lake on east side of crest. Some stands appear to be suffering from insect or disease damage = **II.A.4.N.a.42 PINUS FLEXILIS WOODLAND ALLIANCE** present only on east side, no plots

100A.2Ba.5 Stands dominated by the widespread and common middle and upper montane xerophytic *Pinus jeffreyi* (Jeffrey pine), or in some cases, *P. jeffreyi* may be an important codominant with other tree species including *Abies concolor*,

A. magnifica, and *Juniperus occidentalis* ssp. *australis*. Stands occur on both west and east sides of the crest primarily in ZONES III, VII, and VIII, but exceptionally low stands may occur in Zone II on steep well drained, rocky sites = **II.A.4.N.a.43 PINUS JEFFREYI WOODLAND ALLIANCE (or in some cases; *Juniperus occidentalis* ssp. *australis* alliance)**

100A.2Ba.5a Stands typically of the east side of the crest in Zones VII and VIII

100A.2Ba.5a.1 *Pinus jeffreyi* with other conifers important (> 1% absolute cover) in the canopy or subcanopy

100A.2Ba.5a.1a *Pinus jeffreyi* mixes with *Pinus monophylla* (singleleaf pinyon) usually in concavities and semiriparian settings = **Jeffrey pine-Singleleaf pinyon pine Woodland [*Pinus jeffreyi*-*Pinus monophylla* Woodland] (n=3)**

100A.2Ba.5a.1b *Pinus jeffreyi* mixes with *Abies concolor* and Great Basin shrubs and herbs in the understory; the typical Jeffrey pine-White fir woodland of Zone VIII on northerly slopes and in canyons = **Jeffrey pine-White fir/Roundleaf snowberry/Squirreltail Woodland [*Pinus jeffreyi*-*Abies concolor*/*Symphoricarpos rotundifolius*/*Elymus elymoides* Woodland] (n=3)**

100A.2Ba.5a.1c *Pinus jeffreyi* typically dominates and mixes with *Abies concolor* and westside species of trees shrubs and herbs including *Quercus kelloggii*, *Calocedrus decurrens*, and *Pteridium aquilinum* = **Jeffrey pine-White fir Woodland [*Pinus jeffreyi*-*Abies concolor* Woodland] (n=39)**

100A.2Ba.5a.1c *Pinus jeffreyi* may marginally dominate in sparsely wooded stands with *Juniperus occidentalis* ssp. *australis* (Sierra juniper) also conspicuous in the tree layer = **Sierra juniper Woodland [*Juniperus occidentalis* ssp. *australis* Woodland] (Potter, 1998) (n=41)**

100A.2Ba.5a.2 *Pinus jeffreyi* usually sole conifer in tree layer

100A.2Ba.5a.2a *Pinus jeffreyi* forms a woodland over *Purshia tridentata* (antelope bitterbrush) and other Great Basin shrubs, generally of less sheltered and steep sites than previous (100A.2Ba.5a.1b) = **Jeffrey pine/Antelope bitterbrush Woodland [*Pinus jeffreyi*/*Purshia tridentata* Woodland] (Taylor, 1980) (n=4)**

100A.2Ba.5a.2b *Pinus jeffreyi* forms an open canopy over an open to relatively dense tall shrub or low tree layer of *Cercocarpus ledifolius* (curlleaf mountain mahogany). Usually of rocky slopes in Zones VII–VIII transition = **Jeffrey pine/Curlleaf mountain mahogany Woodland [*Pinus jeffreyi* /*Cercocarpus ledifolius* Woodland] (n=5)**

100A.2Ba.5b Stands typically of the west side of the crest in Zones II and III

100A.2Ba.5b.1 *Pinus jeffreyi* sole canopy dominant with sclerophyllous shrubs (chaparral and montane chaparral species) or smaller trees (*Quercus chrysolepis*) in the understory (If *Abies concolor* and *Pinus lambertiana* are both important as well, see *Abies concolor*-*Pinus lambertiana* Alliance)

100A.2Ba.5b.1a *Pinus jeffreyi* in the overstory with *Quercus chrysolepis* (canyon live oak) as a subcanopy tree and *Arctostaphylos viscida* (whiteleaf manzanita) as a conspicuous shrub, the lowest elevation (4,500–5,500 feet) form of the alliance on the west slope (ecological Zone II), usually on glaciated granitic slopes with outcrops = **Jeffrey pine-Canyon live oak/Whiteleaf manzanita Woodland [*Pinus jeffreyi*-*Quercus chrysolepis*/*Arctostaphylos viscida* Woodland] (n=5)** Note: At ca. 4,700 feet in the Cherry Lake area, there are stands intermediate between this association and the following (100A.2Ba.5b.1b) with open *P. jeffreyi* over low *Q. chrysolepis* with both *A. patula* and *A. viscida* in the understory. These have not been sampled.

100A.2Ba.5b.1b *Pinus jeffreyi* over *Arctostaphylos patula* (greenleaf manzanita). Usually a Zone III type of rocky areas typically more xerophytic than the *P. jeffreyi*/*Q. vaccinifolia* Woodland (100A.2Ba.5b.1c) = **Jeffrey pine/Greenleaf manzanita Woodland [*Pinus jeffreyi*/*Arctostaphylos patula* Woodland] (Potter, 1998) (n=17)**

100A.2Ba.5b.1c *Pinus jeffreyi* over the shrub *Quercus vaccinifolia* (huckleberry oak), a Zone II–III transition type often with rock outcrops and may have other tree species such as *Quercus kelloggii*, *Abies concolor*, *Pinus ponderosa*, or *Calocedrus decurrens* in low cover = **Jeffrey pine/Huckleberry oak [*Pinus jeffreyi*/*Quercus vaccinifolia* Woodland] (Potter, 1998) (n=24)**

100A.2Ba.5b.1d *Pinus jeffreyi* over *Ceanothus cordulatus* (mountain whitethorn). A Zone III type, usually on more well developed soils than previous association (100A.2Ba.5b.1c) = **Jeffrey pine/Mountain whitethorn Woodland [*Pinus jeffreyi*/*Ceanothus cordulatus* Woodland] (Potter, 1998)**

100A.2Ba.5b.1e *Pinus jeffreyi* over *Chrysolepis sempervirens* (bush chinquapin). An association of

ecological Zone III = **Jeffrey pine/Bush chinquapin Woodland** [*Pinus jeffreyi*/*Chrysolepis sempervirens* Woodland] (Talley, 1978) (n=4)

100A.2Ba.5b.2 *Pinus jeffreyi* mixes with either *Abies concolor* (white fir) or *A. magnifica* (red fir) in canopy generally open to intermittent canopy woodlands, if either fir species dominates or codominate and canopy is relatively dense, go to Red fir-White fir alliance (100A.2Bb.3c)

100A.2Ba.5b.2a *Abies magnifica* and *P. jeffreyi* form mixed canopy stands, typically *P. jeffreyi* dominates the stand = **Jeffrey pine-Red fir Woodland** [*Pinus jeffreyi*-*Abies magnifica* Woodland] (Potter, 1998) (n=15)

100A.2Ba.5b.2b *Abies concolor* and *P. jeffreyi* form mixed canopy stands, typically *P. jeffreyi* dominates the stand = **Jeffrey pine-White fir Woodland** [*Pinus jeffreyi*-*Abies concolor* Woodland] (Potter, 1998) (n=42)

100A.2Ba.6 Stands dominated in the short tree layer by *Pinus monophylla* (single leaf pinyon pine). If *Pinus jeffreyi* or *Juniperus occidentalis* ssp. *australis* is important, go to 100A.2Ba.5a.1a (Jeffrey pine alliance) or 100A.2Bc.2 (Sierra juniper alliance). A characteristic alliance of the east side of the crest in Zones VII and VIII = **II.A.4.N.a.45 PINUS MONOPHYLLA WOODLAND ALLIANCE**

100A.2Ba.6a *Pinus monophylla* shares canopy or forms slightly taller layer over tall shrubs of *Cercocarpus ledifolius* (curlleaf mountain mahogany). Understory has *Artemisia tridentata* and *Purshia tridentata* = **Singleleaf pinyon pine/Curlleaf mountain mahogany/Big sagebrush-Antelope bitterbrush Woodland** [*Pinus monophylla*/*Cercocarpus ledifolius*/*Artemisia tridentata*-*Purshia tridentata* Woodland] (n=4)

100A.2Ba.6b *Pinus monophylla* dominant overstory over Great Basin shrubs including *Ribes velutinum* (gummy gooseberry) = **Singleleaf pinyon pine/Gummy gooseberry Woodland** [*Pinus monophylla*/*Ribes velutinum* Woodland] (n=9)

Note: May be synonymous with * *Pinus monophylla*/*Symphoricarpos rotundifolia*-*Ribes velutinum* (usually with at least some *Artemisia tridentata*) (n=3) This is a true woodland with up to 60 percent cover of *P. monophylla* defined from Mojave (Keeler-Wolf and Thomas, 2000).

100A.2Ba.6c A poorly described association with *Pinus monophylla* over *Artemisia tridentata* with *Elymus elymoides* (squirreltail), without the two characteristic species of the above associations = **Singleleaf pinyon pine/Big sagebrush/Squirreltail Woodland** [*Pinus monophylla*/*Artemisia tridentata*/*Elymus elymoides* Woodland] (n=2)

Note: May be synonymous with *Pinus monophylla*/*Artemisia tridentata* (n=5) in NVC. This is a woodland of the Mojave desert and the NVC with tree cover averaging more than 25 percent (Keeler-Wolf and Thomas, 2000)

100A.2Ba.7 Stands strongly dominated (> 60% relative cover) in tree layer by *Pinus monticola* (western white pine). If other conifers are present in greater than 30 percent relative cover, look in lodgepole, red fir, or mountain hemlock alliances. Woodlands of the subalpine and montane Zones III, IV, and VII, generally local and not extensive = **II.A.4.N.a.34 PINUS MONTICOLA WOODLAND ALLIANCE**

Only one association formally defined with *Pinus monticola* and *Pinus contorta* var. *murrayana* (Sierra lodgepole pine) forming an open canopy over typically sparse ground cover that typically includes western needlegrass. = **Western white pine-Lodgepole pine/Western needlegrass Woodland [*Pinus monticola*-*Pinus contorta* var. *murrayana*/*Achnatherum occidentale* Woodland] (n=31)**

100A.2Ba.8 *Pinus ponderosa* (ponderosa pine) the principal canopy species usually greater than 10 percent cover. Locally, *Quercus kelloggii* (black oak) is present, but usually substantially lower cover than *P. ponderosa*. Usually forms open woodlands over shrubs and grasses in the interface between Zones I and II. If *Calocedrus* is present greater than 1 percent, then go to 100A.2Ba.9 = **II.A.4.N.a.32 PINUS PONDEROSA WOODLAND ALLIANCE**

Only one association formally defined with *Pinus ponderosa* and *Quercus kelloggii* forming an open canopy over open to relatively dense *Arctostaphylos viscida* (whiteleaf manzanita) along with other shrubs and herbaceous species of Zones I and II. May have *Quercus wislizeni*, *Pinus lambertiana*, *Pinus attenuata*, and *Pinus sabiniana* in small amounts in canopy and *Chamaebatia foliolosa* (mountain misery) and annual *Bromus* sp. in understory = **Ponderosa pine/Black oak/Whiteleaf manzanita Woodland [*Pinus ponderosa*/*Quercus kelloggii*/*Arctostaphylos viscida* Woodland] (n=5)**

100A.2Ba.9 *Pinus ponderosa* (ponderosa pine) and *Calocedrus decurrens* (incense cedar) both important (> 1% cover) in canopy and/or regeneration layers. Other conifers such as *Abies concolor* and *Pinus lambertiana* may be present, but combined, *P. ponderosa* and *C. decurrens* comprise the most cover = **I.A.8.N.b.?? PINUS PONDEROSA-CALOCEDRUS DECURRENS FOREST ALLIANCE (NEW)**

100A.2 Ba.9a. *Quercus chrysolepis* (canyon live oak) conspicuous in stand. May or may not have *Quercus kelloggii* in tree layer.

100A.2 Ba.9a.1 Stands defined by overstory of *Pinus ponderosa* and *Calocedrus decurrens* with presence of *Quercus chrysolepis* and sparse to dense understory of *Chamaebatia foliolosa*. May have other shrubs such as *Arctostaphylos patula* = **Ponderosa pine-Incense cedar-Canyon live oak/Mountain misery Woodlands [*Pinus ponderosa*-*Calocedrus decurrens*-*Quercus chrysolepis*/*Chamaebatia foliolosa* Woodland] (n=5)**

100A.2Ba.9b *Quercus chrysolepis* absent or unimportant (< 1%), *Quercus kelloggii* (black oak) or no oaks conspicuous in stand

100A.2Ba.9b.1 *Pinus ponderosa* and *Calocedrus decurrens* are dominant and average about 60 percent crown cover; *Quercus kelloggii* present, generally in low cover, throughout stand; may include some *Pinus lambertiana* (sugar pine) at upper elevation extents of type. *Chamaebatia foliolosa* usually absent or inconspicuous = **Ponderosa pine-Incense cedar-Black oak Woodland [*Pinus ponderosa*-*Calocedrus decurrens*-*Quercus kelloggii* Woodland] (n=32)**

100A.2Ba.9b.2 Stands are generally more open than above with scattered to dense understory of *Chamaebatia foliolosa*; may have conspicuous scattered shrubs of *Arctostaphylos patula*, or scattered low herbs of *Galium bolanderi*; may have significant *Pinus lambertiana* in canopy along with other two conifers, generally at coolest (high elevation) extreme of this alliance = **Ponderosa pine-Incense cedar/Mountain misery Woodland [*Pinus ponderosa*-*Calocedrus decurrens*/*Chamaebatia foliolosa* Woodland] (n=3)**

100A.2Ba.10 *Pinus sabiniana* (foothill pine) forms an open overstory generally greater than 10 percent over the variable understory that may include shorter broadleaf trees, shrubs, herbs, and grasses. Generally xeric stands of ecological Zone I = **II.A.4.N.a.27 PINUS SABINIANA WOODLAND ALLIANCE**

Note: This is a variable alliance in the study area with insufficient plot data to define more than two associations. Aside from the types identified in the key below, some additional variations as indicated by individual plots include stands with woody understories with *Umbellularia*, *Cercocarpus betuloides*, *Pseudotsuga menziesii*, and *Quercus kelloggii*. Stands may occur on dry slopes or in riparian terraces and flats. Other sparse stands with annual grass understories also exist.

100A.2Ba.10a *Pinus sabiniana* forms an overstory above the small tree *Quercus wislizeni* (interior live oak) and the shrub *Ceanothus cuneatus* (wedgeleaf ceanothus) = **Foothill pine-Interior live oak/Wedgeleaf ceanothus Woodland [*Pinus sabiniana*-*Quercus wislizeni*/*Ceanothus cuneatus* Woodland] (n=4)**

100A.2Ba.10b *Pinus sabiniana* with *Quercus wislizeni* over the shrub *Adenostoma fasciculatum* (chamise) = **Foothill pine-Interior live oak/Chamise Woodland [*Pinus sabiniana*-*Quercus wislizeni*/*Adenostoma fasciculatum* Woodland] (no plots but consistently interpretable air photo signature, defined as informal mapping unit at this time)**

100A.2Ba.10c *Pinus sabiniana* with *Quercus wislizeni* over *Arctostaphylos viscida* (whiteleaf manzanita) = **Foothill pine-Interior live oak/Whiteleaf manzanita Woodland [*Pinus sabiniana*-*Quercus wislizeni*/*Arctostaphylos viscida* Woodland] (n=4)**

100A.2Ba.10d Stands with very open *Pinus sabiniana* over sparse *Quercus wislizeni* with a grassy or sparse herb understory. A mappable unit used in the vegetation map and is called ***Pinus sabiniana*-*Quercus wislizeni*/Grass Woodland (sparse)** (no plots mapping unit only)

100A.2Ba.10e A poorly defined type with *Pinus sabiniana* over *Arctostaphylos viscida* with no *Quercus wislizeni* (n=2)

100A.2Ba.10f *Quercus douglasii* (blue oak) dominates in canopy with lesser (< 10 percent on average across stand) cover of emergent *Pinus sabiniana* over a grassy understory = **Blue oak-Foothill pine/Grass (*Quercus douglasii*-*Pinus sabiniana*/Grass) (Allen et al., 1991) (n=2)** of the *Quercus douglasii* alliance; see also 100B.1Bb.2a

100A.2Bb One or more fir species (*Abies* spp.) is important in the coniferous canopy.

100A.2Bb.1 *Abies concolor* (white fir) strongly dominant (> 60% relative cover) in canopy and most common tree species in reproduction layers; may be mixed with other conifer species, but if *Pinus lambertiana* (sugar pine) present it covers less than 1 percent = **I.A.8.N.b.?? ABIES CONCOLOR FOREST ALLIANCE** (Note: This alliance has been defined for other parts of California, but all plots with white fir dominant in Yosemite environs also have sugar pine and are probably best considered in White fir–Sugar pine alliance [see 100A.2Bb.2].)

100A.2Bb.2 *Abies concolor* (white fir) usually dominant, but mixed in canopy with sugar pine (*Pinus lambertiana*) at least 5 percent cover. Incense cedar may also be present in high cover. Ponderosa pine and/or Jeffrey pine may be present but usually with lower cover than the previous species = **I.A.8.N.b.?? ABIES CONCOLOR-PINUS LAMBERTIANA ALLIANCE (NEW)**

Note: Several associations formerly classed in the White fir alliance (White fir–Pacific dogwood/Trail plant Association [former p.i. code 4082] White fir–False Solomon's seal–Hooker's Fairybells Association [former code 4083] White fir–Sugar pine–Jeffrey pine) have been moved to White fir–Sugar pine alliance (100A.2Bb.2). There are some stands with dense *A. concolor* and essentially no understory (e.g., Wieslander 476 and 597) that may be borne out as a white fir association with further data.

100A.2Bb.2a *Abies concolor*, *Pinus lambertiana*, and *Calocedrus decurrens* all present over 5 percent cover in canopy. Associations arranged from most mesic to xeric.

100A.2Bb.2a.1 Understory with both *Corylus cornuta* (California hazel) and *Cornus nuttalli* (mountain dogwood), may have *Adenocaulon bicolor* (trail plant). Generally mesic lower slope settings, some stands are semiriparian with scattered *Alnus rhombifolia* (white alder) = **White fir–Sugar pine–Incense cedar/Pacific dogwood/ California hazel Forest [*Abies concolor*-*Pinus lambertiana*-*Calocedrus decurrens*/*Cornus nuttalli*/*Corylus cornuta* var. *californica* Forest] (n=3+1)**

100A.2Bb.2a.2 Understory without regular occurrence of *Corylus* or *Cornus* but with scattered clusters of *Adenocaulon bicolor* (trail plant). Canopy cover relatively high, soil usually moderately deep.

Generally less mesic (mid slope or less sheltered positions) than previous type = **White fir-Sugar pine-Incense cedar/Trail plant Forest** [*Abies concolor*-*Pinus lambertiana*-*Calocedrus decurrens*/*Adenocaulon bicolor* Forest] (=Fites, 1994 ABCO-MCN/ADBI) (n=7)

100A.2Bb.2a.3 Generally moderately open forest in mid or lower slope positions with understory characterized by the creeping viny shrub *Symphoricarpos mollis* and the low herb *Kelloggia galloides*. Moisture conditions usually somewhat drier than previous associations = **White fir-Incense cedar-Sugar pine/Creeping snowberry/Kelloggia Forest** [*Abies concolor*-*Pinus lambertiana*-*Calocedrus decurrens*/*Symphoricarpos mollis*/*Kelloggia galloides* Forest] (=Fites' 1994 ABCO-MCN/SYMO/KEGA) (n=7)

100A.2Bb.2a.4 A moderately open forest in relatively dry settings (upper slopes or southerly exposures) understory with regular occurrence of *Chrysolepis sempervirens* (bush chinquapin) and scattered clumps of *Carex multicaulis* (multistemmed sedge) = **White fir-Sugar pine-Incense cedar/Bush chinquapin/Multistemmed sedge Forest** [*Abies concolor*-*Pinus lambertiana*-*Calocedrus decurrens*/*Chrysolepis sempervirens*/*Carex multicaulis* Forest] (=Fites ABCO-MCN/CHSE2) (n=13)

100A.2Bb.2b *Abies concolor* and *Pinus lambertiana* principal canopy species. Without significant cover of *Calocedrus* (less than 5 percent in canopy or understory) but may have other conifers such as *Pinus jeffreyi*. These associations are arranged from mesic to xeric.

100A.2Bb.2b.1 *Abies concolor* dominant in dense forest with lower cover of *Pinus lambertiana*. Mesic sparse understory includes presence of *Disporum hookeri* and *Maianthemum racemosa* not particularly common in area and may locally be just as mesic phase of the *Abies concolor*-*Pinus lambertiana*-*Calocedrus decurrens*/*Adenocaulon bicolor* Forest (100A.2Bb.2a.2) = **White fir-Sugar pine/False Solomon's seal-Hooker's fairybells Forest** [*Abies concolor*-*Pinus lambertiana*/*Maianthemum racemosa*-*Disporum hookeri* Forest] (Fites, 1994) (n=4)

100A.2Bb.2b.2 *Abies concolor* and *Pinus lambertiana* are sole dominants in overstory, either may be the major species, both are usually over 20 percent relative cover. Canopy can also have lesser amounts of *Pinus ponderosa* and *Quercus kelloggii*. Forests are typically dense and are midslope or more mesic upper slope positions, with little distinction in understory = **White fir-Sugar Pine Forest** [*Abies concolor*-*Pinus lambertiana* Forest] (n=11)

100A.2Bb.2b.3 *Abies concolor* dominant in the canopy including young trees over dense to open shrub layer dominated by *Ceanothus cordulatus* (mountain whitethorn). *Pinus lambertiana* is present (either in regeneration layer, canopy, or both) but usually much less important than *A. concolor*. Generally a recent post fire or post logging (outside of park) association = **White fir/Mountain**

whitethorn Forest [*Abies concolor*/*Ceanothus cordulatus* Forest] (n=4)

100A.2Bb.2b.4 *Abies concolor*, *Pinus lambertiana*, and *Pinus jeffreyi* are all significant components of the canopy (*P. jeffreyi* may range from 2% to 25%). Stands can have shrubby understory including *Ceanothus cordulatus* and *Chrysolepis sempervirens*. Generally open forests of upper slopes or relatively dry exposures = **White fir-Sugar pine-Jeffrey pine Forest [*Abies concolor*-*Pinus lambertiana*-*Pinus jeffreyi* Forest] (n=18)**

100A.2Bb.3 *Abies magnifica* (red fir) and *Abies concolor* (white fir) conspicuous, both greater than 15 percent relative cover in canopy, either may dominate. May have *Pinus lambertiana* and or *P. jeffreyi*. Stands generally occur in cooler and/or more mesic settings than White fir or White fir-sugar pine alliances = **I.A.8.N.c. ?? RED FIR-WHITE FIR ALLIANCE (Parker, 1984; Parker, 1982)**

Associations are arranged from mesic to xeric.

100A.2Bb.3a *Abies concolor*, *Pinus lambertiana*, and *Abies magnifica* are present, usually with the first two species dominant. Typically located upward in elevation from slightly warmer *Abies concolor*-*Pinus lambertiana* Forest = **Red fir-White fir-Sugar pine Forest [*Abies magnifica*-*Abies concolor*-*Pinus lambertiana* Forest (Potter, 1998) (n=14)**

100A.2Bb.3b *Abies magnifica* and *Abies concolor* typically only canopy species, either may dominate (both at least 15% relative cover). Ranges over a variety of slope positions and exposures depending on elevation. Typically largest stands are on midslopes in somewhat mesic settings = **Red fir-White fir Forest [*Abies magnifica*-*Abies concolor* Forest] (Potter, 1998) (n=23)**

100A.2Bb.3c Either *Abies magnifica* or *A. concolor* may be dominant, with *Pinus jeffreyi* important (> 5 percent relative cover) in stand. Relatively xeric locations (shallow soils on upper slopes or on sunny slope exposures) = **Red fir-White fir-Jeffrey pine Forest [*Abies magnifica*-*Abies concolor*-*Pinus jeffreyi* Forest] (Potter, 1998) (n=11)**

100A.2Bb.4 *Abies magnifica* dominant overstory tree and present in reproduction layers. May include several other tree conifers in stand, but white fir, sugar pine, and other warmer climate species (typically from lower elevations) are unimportant (< 5% relative cover) = **I.A.8.N.c.26 ABIES MAGNIFICA FOREST ALLIANCE**

100A.2Bb.4a *Abies magnifica* and *Pinus monticola* (western white pine) only trees in canopy, both important (> 1 % cover) in canopy, generally with *A. magnifica* dominant. The following associations are arranged in order of mesic to xeric.

100A.2Bb.4a.1 *A. magnifica* and *P. monticola* form moderately closed forest with no characteristic understory species. Usually on

relatively mesic and shaded mid and upper slopes = **Red fir-Western white pine Forest** [*Abies magnifica*-*Pinus monticola* Forest] (Potter, 1998) (n=25)

100A.2Bb.4a.2 *A. magnifica* and *P. monticola* form a more open canopy than previous type, with small to moderately large light gaps having understory of *Arctostaphylos nevadensis* (pinemat manzanita). Usually on upper slopes and ridges, but somewhat less exposed or xeric than following association = **Red fir-Western white pine/Pinemat manzanita Forest** [*Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis* Forest] (Potter, 1998) (n=10)

100A.2Bb.4a.3 *A. magnifica* and *P. monticola* form moderately open canopy with understory openings occupied by shrubs of *Chrysolepis sempervirens* (bush chinquapin). Often on southerly exposures within the upper red fir zone = **Red fir-Western white pine/Bush chinquapin Forest** [*Abies magnifica*/*Chrysolepis sempervirens* Forest] (Potter, 1998) (n=4)

100A.2Bb.4a.4 *A. magnifica* and *P. monticola* form moderately open canopy with understory openings dominated by shrubs of *Quercus vaccinifolia* (huckleberry oak). Probably closely related to the above 100A.2Bb.4a.2 and 100A.2Bb.4a.3 but other shrubs substantially less important than in those associations. Usually of more xeric (southerly) exposures near crests of ridges. Not a formally defined type but observed in several sites in ZONEs III and IV. = **Red fir-Western white pine/Huckleberry oak Forest** [*Abies magnifica*/*Quercus vaccinifolia* Forest] (undescribed preliminary type)

100A.2Bb.4b *Abies magnifica*, *Pinus monticola*, and/or *Pinus contorta* var. *murrayana* present in canopy.

100A.2Bb.4b.1 *Abies magnifica*, *P. monticola*, and *P. contorta* ssp. *murrayana* present in the canopy throughout the stand, generally with *A. magnifica* as major dominant and two pines as subordinate. Found on lower slopes and on protected midslopes throughout much of the red fir belt = **Red fir-Western white pine-Lodgepole pine Forest** [*Abies magnifica*-*Pinus monticola*-*Pinus contorta* var. *murrayana* Forest] (Potter, 1998) (n=30)

100A.2Bb.4b.2 *A. magnifica* and *P. contorta* are principal canopy species, *Pinus monticola* absent or of very low importance (< 1% cover). Forest moderately dense and productive with insignificant shrub layer and scattered individuals of *Hieracium albiflorum* (Whiteflower hawkweed) and a few other herbs, shrubs unimportant. Widespread often adjacent to and immediately upslope from more mesic associations of the mapping area within the upper red fir belt = **Red fir-Lodgepole pine/Whiteflower hawkweed Forest** [*Abies magnifica*-*Pinus contorta* var. *murrayana*/*Hieracium albiflorum* Forest] (Potter, 1998) (n=19)

100A.2Bb.4c *Abies magnifica* sole species in canopy or other trees species other than above (such as *Juniperus occidentalis* ssp. *australis*) may be present in small numbers, particularly in understory. These associations are ordered from mesic to xeric.

100A.2Bb.4c.1 *A. magnifica* is sole dominant and forms moderately dense to dense forests. Usually with deep litter and very little understory vegetation. May occur on many slope exposures depending on elevation, usually on fairly well developed soil = **Red fir Forest [*Abies magnifica* Forest] (Potter, 1998) (n=37)**

100A.2Bb.4c.2 *A. magnifica* sole dominant over relatively open understory with *Arctostaphylos nevadensis* (pinemat manzanita) characteristic. Usually on shallow soils of upper slopes and ridges = **Red fir/Pinemat manzanita Forest [*Abies magnifica*/ *Arctostaphylos nevadensis* Forest] (Potter, 1998) (n=5)**

100A.2Bb.4c.3 *A. magnifica* forms open overstory over relatively xeric understory dominated or characterized by *Wyethia mollis* (mules ears), but with several other herbaceous and subshrub species. Usually on volcanic mudflow deposits (locally at northern end of the mapping area) = **Red fir/Mules ears Forest [*Abies magnifica*/*Wyethia mollis* Forest] (Potter, 1998) (n=0)** No samples within study area, but verified visually from N portion on volcanic lahars

100A.2Bc A species in the cypress family (*Calocedrus decurrens*, *Juniperus occidentalis* ssp. *australis*) is dominant or conspicuous conifer in the canopy. Note that *Juniperus* is a strong indicator of xeric and rocky settings. Other conifers such as *Pinus jeffreyi*, *Abies magnifica*, and *A. concolor* may be present in near equal amounts to *J. occidentalis*. However, *J. occidentalis* alliance criteria are still met when it is only a codominant.

100A.2Bc.1 *Calocedrus decurrens* dominant and/or conspicuous conifer in canopy. The winter deciduous tree *Alnus rhombifolia* is usually present in local stands and may dominate immediately adjacent to streams and seeps; typically stands occur in riparian or semiriparian settings on the west side of the crest within ecological Zones II and III = **I.A.8.N.c. ?? CALO CEDRUS DECURRENS FOREST ALLIANCE**

100A.2Bc.1a *Calocedrus* and *Alnus* are principal trees in the stand; may also include scattered *Abies concolor* and *Pseudotsuga menziesii*. Understory may include *Cornus nuttalli* and *Rhododendron occidentale*. Stands occupy bottoms and terraces adjacent to streams or other wetlands = **Incense cedar-White alder Forest [*Calocedrus decurrens*-*Alnus rhombifolia* Forest] (Potter, 2000 ms) (n=6)**

100A.2Bc.2 *Juniperus occidentalis* ssp. *australis* (Mountain or Sierra juniper) conspicuous tree; usually covers less than 30 percent (and down to 2% absolute cover when its relative cover is high) of the stand over sparse to intermittent shrubby or

herbaceous understory; associated with rocky slopes on both sides of the crest in ecological Zones III, IV, and VII. May occur with additional conifers in low cover, particularly *Pinus jeffreyi*, *Abies concolor*, and/or *Abies magnifica* = **II.A.4.N.a.37 JUNIPERUS OCCIDENTALIS ssp. AUSTRALIS WOODLAND ALLIANCE**

100A.2Bc.2a Stands largely of the west side without *Artemisia tridentata* or *Cercocarpus ledifolius* as significant components. Widespread on sunny, exposed granitic (usually high bedrock %) slopes and ridges = **Sierra juniper Woodland [Juniperus occidentalis ssp. australis Woodland] (Potter, 1998) (n=41)**

Note: There is one large association that occurs largely on the west side in Zone III. Variation within has been identified, and currently, two phases as well as the general association are recognized. There are also anomalous high-elevation stands that occur in ecological Zone IV with *Pinus monticola* and *Pinus contorta* intermixing.

100A.2Bc.2a.1 A high-elevation westside phase with *Juniperus* over a relatively high cover of the matted shrub *Arctostaphylos nevadensis* = **Sierra juniper/Pinemat manzanita Woodland (Juniperus occidentalis australis ssp./Arctostaphylos nevadensis Woodland) phase (n=3)**

100A.2Bc.2a.2 Another phase in rocky outcrops areas where *Holodiscus discolor* (oceanspray) is the predominant shrub = **Sierra juniper/Oceanspray Woodland phase (Juniperus occidentalis ssp. australis/Holodiscus discolor Woodland phase) (n=5)**

100A.2Bc.2b *Juniperus occidentalis* ssp. *australis* and *Cercocarpus ledifolius* (curlleaf mountain mahogany) both conspicuous, an eastside association on relatively steep rocky slopes in Zone VII = **Sierra juniper/Curlleaf mountain mahogany/Big sagebrush Woodland [Juniperus occidentalis ssp. australis-Cercocarpus ledifolius/Artemisia tridentata Woodland] (n=4)**

100A.2Bc.2c *Juniperus occidentalis* ssp. *australis* forms open canopy over *Artemisia tridentata* (big sagebrush); may occur on both east and west sides of crest, but on west side usually associated with volcanics in northern portion of mapping area = **Sierra juniper/Big sagebrush Forest [Juniperus occidentalis ssp. australis/Artemisia tridentata Forest] (Potter, 1998) (n=6)**

100A.2Bd *Pseudotsuga menziesii* (Douglas-fir) is important in the canopy; may be mixed with other conifer species including *Pinus ponderosa*, *Calocedrus decurrens*, and *Abies concolor*. All species may codominate.

100A.2Bd.1 *Pseudotsuga menziesii* (Douglas-fir) dominant or conspicuous conifer in canopy. May be mixed with other conifers or hardwood tree species, but *Pseudotsuga* is always found as mature individual and as scattered reproduction in the stands. Stands are at the southern limits of their range in the Yosemite region and are typically limited to sheltered, mesic, and low elevation sites, often adjacent to cliff bases or watercourses within ecological Zones II or III. Insufficient data sets exist to define more than three associations, though outlier samples have been collected including two examples of a streamside type with *Alnus rhombifolia* = **I.A.8.N.c.22 PSEUDOTSUGA MENZIESII FOREST ALLIANCE** or **I.A.8.N.c. ?? PSUEDOTSUGA MENZIESII-PINUS PONDEROSA FOREST ALLIANCE**

Associations are listed in order of coolest to warmest ecological settings.

100A.2Bd.1a *Pseudotsuga* occurs as codominant or subdominant with *Abies concolor* and *Calocedrus decurrens* found on northerly facing bases of cliffs and slopes in Yosemite Valley and in Tuolumne River drainage and on northerly facing slopes near Harden Flat and Golden Arrow Road = **Douglas-fir-White fir-Incense cedar Forest [*Pseudotsuga menziesii*-*Abies concolor*-*Calocedrus decurrens* Forest] (n=7)**

100A.2Bd.1b *Pseudotsuga* occurs with *Pinus ponderosa* and *Calocedrus decurrens* in canopy found on lower slopes and bottoms adjacent to streams and ravines, generally below 4,000 feet elevation in Merced River Canyon or Tuolumne River drainage, and in Harden Flat = **Douglas-fir-Ponderosa pine-Incense cedar Forest [*Pseudotsuga menziesii*-*Pinus ponderosa*-*Calocedrus decurrens* Forest] (n=5) of the *Pseudotsuga menziesii*-*Pinus ponderosa* Forest Alliance**

100A.2Bd.1c *Pseudotsuga* occurs with *Quercus chrysolepis* as only other major tree species on lower steep slopes and bases of cliffs. In some cases *Pseudotsuga* is emergent over a more continuous layer of *Quercus chrysolepis* = **Douglas-fir-Canyon live oak Forest [*Pseudotsuga menziesii*-*Quercus chrysolepis* Forest] (Taylor & Teare, 1979a) (n=10)**

100A.2Bd.1d *Pseudotsuga* occurs as an overstory over *Alnus rhombifolia* (White alder). A riparian type occurring along small creeks in Zone II particularly on the Tuolumne River drainage; poorly sampled, but seen more than 10 times by photointerpreters = ***Pseudotsuga menziesii*-*Alnus rhombifolia* Forest (n=2)**

100A.2Be *Tsuga mertensiana* (mountain hemlock) important conifer in canopy.

100A.2Be.1 *Tsuga mertensiana* (mountain hemlock) is either dominant or important and conspicuous tree. Forests or woodlands of mesic subalpine zone. May include up to equal or higher cover of other trees such as *Abies magnifica*, *Pinus contorta* var. *murrayana*, or *Pinus monticola* but does not include significant cover of *Pinus albicaulis* (see *Pinus albicaulis* alliance) = **I.A.8.N.c.11 TSUGA MERTENSIANA FOREST ALLIANCE**

The following associations are arranged in order of increasing coolness of environments (e.g., all other things being equal, increasing elevation)

100A.2Be.1a *Tsuga mertensiana* common and conspicuous, may have equal or even higher cover of *Abies magnifica* in canopy, soil generally better developed (e.g., on lower slopes) and less steep (usually < 30% slope) than following association; may have *Pinus contorta* in low to moderate cover, usually less important than previous two species of conifers = **Mountain hemlock Forest [*Tsuga mertensiana* Forest] (Potter, 1998) (n=21)**

100A.2Be.1b *Tsuga mertensiana* and *Pinus monticola* both important in canopy and understory; generally northerly facing slopes of moderate steepness or on upper slopes or ridges; tree cover is moderately dense, soils moderate to shallow = **Mountain hemlock-Western white pine Forest [*Tsuga mertensiana*-*Pinus monticola* Forest] (n=19)** Note: This is renamed and includes Potter's (1998) mountain hemlock/steep association.

100A.2Be.1c *Tsuga mertensiana* and *Pinus contorta* var. *murrayana* are the only tree species of significant cover; either may be dominant. Understory species are generally low cover and uncharacteristic. Plots included herein are Wieslander plots and tend to underrepresent understory species cover and composition. Included herein are plots formerly believed to represent the putative *Tsuga mertensiana*-*Pinus contorta* var. *murrayana*/*Phyllodoce breweri* Forest and the *Tsuga mertensiana*-*Pinus contorta* var. *murrayana*/*Carex rossii* Forest from the preliminary classification. Because Wieslander plots cannot reliably be used to identify understory herbaceous species, these are currently lumped into this type, which may be considered a "suballiance" rather than a well-defined association. Stands occur at lower, middle, and upper slope positions and may have open to relatively continuous overstories = **Mountain hemlock-Lodgepole pine Forest [*Tsuga mertensiana*-*Pinus contorta* var. *murrayana* Forest] (n=32)**

100A.2Be.1d *Tsuga mertensiana* and *P. contorta* ssp. *murrayana* are joined by *Pinus monticola* as important in the canopy. Generally rockier and more exposed than the previous three associations, upper or midslope locations = **Mountain hemlock-Lodgepole pine-Western white pine Forest [*Tsuga mertensiana*-*Pinus contorta* var. *murrayana*-*Pinus monticola* Forest] (Parker, 1988) (n=23)**

100A.2Be.1e *Tsuga mertensiana* is joined by *Pinus albicaulis*, sometimes with low cover of *Pinus contorta* as well. Generally occurs in highest elevations and coolest sites, though stands may vary; some quite open and others with relatively high cover. These stands occur on ridges or on upper thirds of slopes, typically on northerly exposures = **Whitebark pine - Mountain hemlock Woodland [*Pinus albicaulis* -*Tsuga mertensiana* Woodland] (part of *Pinus albicaulis* alliance, see 100A.2Ba.2a)**

100B Winter deciduous forests and woodlands. Winter deciduous species generally contribute greater than 50 percent of the total tree (relative) cover. However, some stands in this group are characterized by the deciduous tree being of high importance but not dominant. Some alliances are modally considered forest, but others may range down into woodland (25–60% tree cover), or even sparsely wooded shrubland or herbaceous (< 25% cover of trees). Note: If forest is codominated by both evergreen and deciduous species, go to 100C (mixed evergreen and deciduous forest).

100B.1. Deciduous forests (or woodlands) of uplands or marginal wetlands. Major deciduous tree species are *Populus tremuloides* or the oaks *Quercus kelloggii*, *Q. douglasii*, or *Q. lobata*. Dominant species typically not with roots or stems immediately adjacent to year-round flowing water (but see some aspen stands).

100B.1A Relatively dense to open forest or woodland with *Populus tremuloides* (quaking aspen) usually dominant (> 50% relative cover) or in the case of the aspen-Jeffrey pine, or aspen-lodgepole pine associations, important tree. May have mixtures of other conifers in canopy including *Abies*

concolor, *A. magnifica*, *Pinus jeffreyi*, *P. contorta* ssp. *murrayana* = **I.B.2.N.b.10 POPULUS TREMULOIDES FOREST ALLIANCE**

100B.1Aa *Populus tremuloides* in upland settings away from immediate influence of saturated soil or flowing water. May include up to 15% cover of *Pinus monticola*, *P. contorta*, *P. jeffreyi*, or *Juniperus occidentalis*.

100B.1Aa.1 Understory largely xeric shrubs and herbs including relatively high cover of *Artemisia tridentata*. Primarily on east side of Sierra Crest = **Aspen/Big sagebrush Forest [Populus tremuloides/Artemisia tridentata Forest] (upland aspen) (n=13)**

Includes a phase with more diverse shrub and herb components = **Aspen/Big sagebrush/Mountain pennyroyal-Kelloggia Forest (Populus tremuloides/Artemisia tridentata/Monardella odoratissima-Kelloggia galloides) phase (n=5)**

100B.1Aa.2 *Artemisia tridentata* usually unimportant in stands, but *Monardella odoratissima* present in all stands, may be on east or west side of Sierra Crest = **Aspen/mountain pennyroyal Forest [Populus tremuloides/Monardella odoratissima Forest] (Potter, 1998) (n=1)**

100B.1Ab. *Populus tremuloides* in moist stands with mesic to hydric understory species, riparian or meadow settings on east and west side of Sierra Crest.

100B.1Ab.1 *Pinus jeffreyi* a significant component in tree and/or sapling layer, usually along narrow streams with moderate to steep gradients or upland settings adjacent to meadows on east side of Sierra Crest = **Aspen-Jeffrey pine Forest [Populus tremuloides-Pinus jeffreyi Forest] new (n=6)**

100B.1Ab.2 *Pinus contorta* var. *murrayana* important or even marginally dominant in stands, usually moderately mesic understory including *Poa pratensis* and scattered *Artemisia tridentata*. Eastside meadows and low gradient creek banks = **Aspen-Lodgepole pine/Big sagebrush/Kentucky bluegrass Forest [Populus tremuloides-Pinus contorta/Artemisia tridentata/Poa pratensis Forest] (n=5)**

100B.1Ab.3 Conifers unimportant in stands, but riparian shrubs including *Rosa woodsii* and *Salix* spp. are significant understory. Eastside riparian settings = **Aspen/Woods rose Forest [Populus tremuloides/Rosa woodsii Forest] (n=6)**

100B.1Ab.4 *Veratrum californicum* and an assortment of other wetland or mesophytic herbs and grasses in understory, usually low gradient meadow edges. May be west side or east side of the crest = **Aspen/California corn lily Forest [Populus tremuloides/Veratrum californicum Forest] (Potter, 1998) (n=8)**

100B.1B A deciduous oak (*Quercus* sp.) the important canopy tree, may include conifers such as *Pseudotsuga menziesii*, *Pinus ponderosa*, *P. sabiniana*, or *Calocedrus decurrens*.

100B.1Ba *Quercus kelloggii* (California black oak) major tree in canopy, may have emergent (< 10%) conifers, but *Q. kelloggii* is the dominant (> 50% relative cover) throughout the stand = **I.B.2.N.b?? QUERCUS KELLOGGII FOREST ALLIANCE**

Note: Several stands have been sampled that show some variation in understory beyond defined associations including stands with *Pteridium aquilinum* (bracken fern), stands in rocky low elevation sites with *Aesculus californica* (California buckeye), *Cercocarpus betuloides* (birch-leaf mountain mahogany), and emergent *Pinus sabiniana* (foothill pine); none have sufficient sample sizes to define associations.

100B.1Ba.1 *Calocedrus decurrens* (incense cedar) present in either sapling/seedling or tree layer. May also include *Pseudotsuga menziesii* (Douglas-fir) in low cover. Widespread on west side of Sierra Crest in ecological Zone II, may be on all slope exposures depending on elevation = **Black oak-Incense cedar Forest [*Quercus kelloggii*-*Calocedrus decurrens* Forest] (n=9)**

100B.1Ba.2 Understory with *Arctostaphylos mewukka* (Mewuk manzanita) and the subshrub *Chamaebatia foliolosa* (mountain misery), generally somewhat xeric exposures (southerly facing slopes and ridges) in ecological Zone II = **Black oak/Mewuk manzanita/Mountain misery Forest [*Quercus kelloggii*/*Arctostaphylos mewukka*-*Chamaebatia foliolosa* Forest] (n=3)**

100B.1Ba.3 Generally xeric stands on shallow rocky soil of upper elevation extent of the alliance, may have scattered *Pinus jeffreyi* (Jeffrey pine) or other mid-elevation conifers. *Arctostaphylos patula* variable, but usually greater than 5 percent may have *Ceanothus cordulatus*, *Prunus emarginata*, and other montane chaparral shrubs = **Black oak/Greenleaf manzanita Forest [*Quercus kelloggii*/*Arctostaphylos patula* Forest] (Allen et al., 1991) (n=5)**

100B.1Ba.4 Open stands of *Q. kelloggii* with a grassy or herbaceous understory with *Pteridium aquilinum* common or conspicuous. Insufficient plots for association description, but photo signature discernable and treated as a mapping unit currently = **Black oak/Bracken fern Forest [*Quercus kelloggii*/*Pteridium aquilinum* Forest] mapping unit (n=2)**

100B.1Bb *Quercus douglasii* (blue oak) dominant or conspicuous in canopy, may include other evergreen trees such as *Quercus wislizeni* (interior live oak) or *Pinus sabiniana* (foothill pine) in lesser numbers. Of xeric low elevation west side, ecological Zone I = **II.B.2.N.a.14 QUERCUS DOUGLASII WOODLAND ALLIANCE**

100B.1Bb.1 *Quercus douglasii* sole important tree.

100B.1Bb.1a Forms a woodland over an open to intermittent shrub layer dominated by *Ceanothus cuneatus* (wedgeleaf ceanothus), which is underlain by annual grasses and herbs = **Blue oak/Wedgeleaf ceanothus/Annual grass Forest [*Quercus douglasii*/*Ceanothus cuneatus*/grass Forest] (Allen et al., 1991) (n=1)**

100B.1Bb.1b Forms a layer over a grassy understory including *Bromus* sp. and *Daucus pusillus* = **Blue oak/Nonnative brome grass-Wild carrot Woodland [*Quercus douglasii*/*Bromus* sp.-*Daucus pusillus*] Woodland (n=5)**

100B.1Bb.2 *Quercus douglasii* mixes in canopy with *Pinus sabiniana* and/or *Quercus wislizeni*.

100B.1Bb.2a *Q. douglasii* dominates in canopy with lesser (< 10% on average across stand) cover of emergent *Pinus sabiniana* over a grassy understory in both lower Merced and Tuolumne River (Cherry Creek Rd., Drew Meadow) canyons. *Quercus wislizeni* generally absent or inconspicuous = **Blue oak-Foothill pine/Grass Woodland [*Quercus douglasii*-*Pinus sabiniana*/grass Woodland]** (Allen et al., 1991) (n=2)

100B.1Bb.2b *Q. douglasii* and *Quercus wislizeni* present in the canopy over an annual dominated herbaceous understory. May have sparse (usually < 5%) *Pinus sabiniana* = **Blue oak-Interior live oak/Nonnative brome grass-Wild carrot Woodland [*Quercus douglasii*-*Quercus wislizeni*/*Bromus* sp.-*Daucus pusillus* Woodland]** (Allen et al., 1991) (n=6)

100B.1Bc *Quercus lobata* (valley oak) dominant or conspicuous in canopy. May include *Q. wislizeni*, *Q. douglasii*, and/or *Q. kelloggii* in stand. Of very limited extent in study area (less than 4 stands), restricted to flats and terraces above lower Merced River channel in ecological Zone I = **II.B.2.N.a.18 QUERCUS LOBATA WOODLAND ALLIANCE** - no associations defined (n=3)

100B.1C *Aesculus californica* (California buckeye) dominant or conspicuous tree in stand. Usually small stands in somewhat mesic concavities on steep lower to mid slopes of Merced River Canyon associated with *Quercus wislizeni* or other oak stands = **II.B.2.N.a.2 AESCULUS CALIFORNICA WOODLAND ALLIANCE**

No well-defined associations. Only two plots sampled; suggests rocky sites with *Lupinus albifrons* or moist sites with *Datisca glomerata*.

100B.2. Deciduous forests or woodlands of wetlands, typically temporarily flooded by flowing waters of streams or rivers with major deciduous species being *Alnus rhombifolia*, *Populus balsamifera*, *P. fremontii*, *Salix laevigata*, or *Fraxinus latifolia* = I.B.2.N.d. Temporarily flooded cold deciduous forest

100B.2A *Alnus rhombifolia* dominant or important tree = **I.B.2.N.d.31 ALNUS RHOMBIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE**

100B.2Aa *Alnus* occurs along large westside streams and river terraces often mixed with tree species other than *Calocedrus decurrens*. These include broadleaf deciduous or evergreen species such as *Salix lasiolepis*, *S. laevigata*, *Acer macrophyllum*, *Quercus chrysolepis*, and *Umbellularia californica* as well as conifers such as *Pinus ponderosa*. May include short trees such as *Cornus nuttallii* in understory and in permanently flooded areas (stream channels) may include the herb *Darmeria peltatum* = **White alder Forest [*Alnus rhombifolia* Forest]** [Potter 1000] (n=8)

100B.2Ab *Populus balsamifera* ssp. *trichocarpa* (black cottonwood) conspicuous and often dominant. Typically riparian stands adjacent to standing or flowing water = **I.B.2.N.d.36**

**POPULUS BALSAMIFERA SSP. TRICHOCARPA TEMPORARILY FLOODED
FOREST ALLIANCE**

100B.2Ab.1 *P. balsamifera* occurs in riparian stands on west side of Sierra Crest typically mixed with *Rhododendron occidentale* (western azalea) and willows such as *Salix lasiolepis* = **Black cottonwood/Western azalea Forest [*Populus balsamifera* ssp. *trichocarpa*/ *Rhododendron occidentale* Forest]** (n=3)

100B.2Ab.2 *P. balsamifera* typically occurs along lakes and streams on east side of Sierra Crest mixed with *Pinus jeffreyi* (Jeffrey pine). Understory may include *Cornus sericea* and *Rosa woodsii*. *Abies concolor* may be present in canopy or understory = **Black cottonwood-Jeffrey pine Forest [*Populus balsamifera* ssp. *trichocarpa*-*Pinus jeffreyi* Forest]** (n=3)

100B.2Ac *Populus fremontii* (Fremont cottonwood) major canopy tree, stands uncommon in study area, noted only on east side in Mono Basin along permanent streams below 1,800 meters elevation. No plots and no association defined, but stand with willows noted on Photointerpretation Reconnaissance (PI Recon.) trip = **I.B.2.N.d.38 POPULUS FREMONTII TEMPORARILY FLOODED FOREST ALLIANCE**

100B.2Ad *Fraxinus latifolia* (Oregon ash) major tree or shrubby tree. Typically scattered small stands along Merced River on low elevation west side of study area. Stands usually in or immediately adjacent to active river channel, may include *Cephalanthus occidentalis* (buttonwillow) = **I.B.2.N.e.28 FRAXINUS LATIFOLIA SEASONALLY FLOODED FOREST ALLIANCE** (defined by Potter 1,000-m² plots) (n=2) insufficient for further association description

100B.2Ae *Salix laevigata* (red willow) the dominant tree = **II.B.2.N.b.14 SALIX LAEVIGATA TEMPORARILY FLOODED WOODLAND ALLIANCE**

No associations defined, typically small stands of low gradient rivers and streams in Zones I and II as in Yosemite Valley (n=2)

100C Mixed evergreen deciduous forest. Evergreen and deciduous species generally contribute 25–75 percent of total tree cover.

100C.1 Stands are relatively even mixes of coniferous evergreen and cold deciduous trees.

100 C.1A. Forests codominated by *Populus tremuloides* (aspen) and a conifer, *Pinus contorta* var. *murrayana* (lodgepole pine)

100C.1Aa Either *Populus tremuloides* (aspen) or *Pinus contorta* var. *murrayana* (lodgepole pine) dominant in stands, usually moderately mesic understory including *Poa pratensis* and scattered *Artemisia tridentata*. Eastside meadows and low gradient creek banks = **Aspen-Lodgepole pine/Big sagebrush/Kentucky bluegrass Forest [*Populus tremuloides*-*Pinus contorta*/*Artemisia tridentata*/*Poa pratensis* Forest]** (n=4)

100C.1Ab *Pinus jeffreyi* a significant component in tree and/or sapling layer. Usually along narrow streams with moderate to steep gradients or upland settings adjacent to meadows on east side of Sierra Crest = **Aspen-Jeffrey pine Forest [*Populus tremuloides* -*Pinus jeffreyi* Forest]** new (n=6)

100C.1B *Calocedrus* and *Alnus* are principal trees in stand, may also include scattered *Abies concolor* and *Pseudotsuga menziesii*. Understory may include *Cornus nuttallii* and *Rhododendron occidentale*.

Stands occupy bottoms and terraces adjacent to streams or other wetlands = **Incense cedar–White alder Forest [*Calocedrus decurrens*-*Alnus rhombifolia* Forest] (Potter 2000 ms) (n=6)**

100C.1C *Calocedrus decurrens* (incense cedar) and *Quercus kelloggii* (black oak) conspicuous in either sapling/seedling or tree layer. May also include *Pseudotsuga menziesii* (Douglas-fir) in low cover. Widespread on west side of Sierra Crest in ecological Zone II; may be on all slope exposures depending on elevation = **Black oak-Incense cedar Forest [*Quercus kelloggii*-*Calocedrus decurrens* Forest] (n=9)**

100C.1D *Pinus ponderosa* and *Quercus kelloggii* (black oak) are both conspicuous in overstory, may have *Calocedrus*.

100C.1Da *Pinus ponderosa* and *Calocedrus decurrens* are dominant and average about 60 percent crown cover. *Quercus kelloggii* present, generally in low to moderate cover, throughout stand, may include some *Pinus lambertiana* (sugar pine) at upper elevation extents of type. *Chamaebatia foliolosa* usually absent or inconspicuous = **Ponderosa pine-Incense cedar-Black oak Forest [*Pinus ponderosa*-*Calocedrus decurrens*-*Quercus kelloggii* Forest] (n=32)** (see also 100A.2Ba.9b.1)

100C.1Db *Pinus ponderosa* and *Calocedrus decurrens* are dominant. Stands are generally more open than above with scattered *Chamaebatia foliolosa*, may have conspicuous scattered shrubs of *Arctostaphylos patula* or scattered low herbs of *Galium bolanderi*; may have significant *Pinus lambertiana* in canopy along with other two conifers, generally at coolest (high elevation) extreme of this alliance = **Ponderosa pine-Incense cedar/Mountain misery Forest [*Pinus ponderosa*-*Calocedrus decurrens*/*Chamaebatia foliolosa* Forest] (n=6)** (see also 100A.2Ba.9b.2)

100C.1Dc. *Calocedrus* usually absent. *Pinus ponderosa* and *Quercus kelloggii* forming an open to intermittent canopy over open to relatively dense *Arctostaphylos viscida* (whiteleaf manzanita) along with other shrubs of the chaparral belt. May have *Quercus wislizeni*, *Pinus lambertiana*, *Pinus attenuata*, and *Pinus sabiniana* in small amounts in canopy and *Chamaebatia foliolosa* (mountain misery) and annual *Bromus* sp. in understory = **Ponderosa pine/Black oak/Whiteleaf manzanita Forest [*Pinus ponderosa*/*Quercus kelloggii*/*Arctostaphylos viscida* Forest] (n=5)** (see also 100A2Ba.8)

DIVISION 200: VEGETATION CHARACTERIZED BY SHRUBS AND SUBSHRUBS

200A Shrubs the dominant canopy species, may have denser herbaceous understory, but shrubs typically at least 10 percent cover in most stands. Shrubs usually 0.5 to five meters tall with individuals or clumps not touching to interlocking (generally forming > 25% canopy cover, but see 200A.1A). For scrubs averaging under 0.5 meter in canopy height see dwarf-shrubland section (200B).

200A.1 Evergreen shrubland. Evergreen species generally contribute greater than 75 percent of the total shrub and/or tree cover.

200A.1A Leaves not hardened by a waxy cuticle (sclerophyllous), soft and pliant. Locally represented by a single alliance characterized by the palmately leaved, short-lived *Lupinus albifrons* in Zones I and II. Cover may be sparse (< 25% cover of shrubs) over herbaceous or sparsely herbaceous (or rocky) understory. Another short-lived perennial broad-leaved shrub, *Eriodictyon californica* (Yerba santa) may codominate the shrub layer in some stands. III.A.2.N.a. Temperate broad-leaved evergreen shrubland

Generally seral in recently burned or otherwise disturbed rocky areas in Zones I and II on southerly exposures = **III.A.2.N.a.?? LUPINUS ALBIFRONS SHRUBLAND ALLIANCE**. Only one undifferentiated type identified = *Lupinus albifrons* Herbaceous Vegetation (n=3)

Note: Some very rocky and steep stands with scattered *L. albifrons* in the canopy have mats of *Selaginella hansenii* in the understory; such stands have not been adequately sampled to define associations.

200A.1B Leaves hardened by a waxy cuticle; sclerophyllous-leaved shrubs the principal canopy species. This includes all chaparral and evergreen montane chaparral scrubs and, by tradition, the needle-leaved *Adenostoma fasciculatum*) = III.A.2.N.c Sclerophyllous temperate broad-leaved evergreen shrubland.

200A.1Ba Chaparral with *Adenostoma fasciculatum* dominant or important.

200A.1Ba.1 Chaparral dominated by *Adenostoma fasciculatum* (chamise) with no other species equaling or exceeding it in cover = **III.A.2.N.c.2 ADENOSTOMA FASCICULATUM SHRUBLAND ALLIANCE**

200A.1Ba.1a Chamise and whiteleaf manzanita (*Arctostaphylos viscida*) co-occur, but the manzanita is always less than 30 percent relative cover = **Chamise-Whiteleaf manzanita Shrubland [*Adenostoma fasciculatum*-*Arctostaphylos viscida* Shrubland] (n=2)**

200A.1Ba.1b Chamise either sole dominant or other shrub species such as *Ceanothus cuneatus* (wedgeleaf ceanothus) may co-occur, but these at low cover below 30 percent relative cover = **Chamise Shrubland [*Adenostoma fasciculatum* Shrubland] (n=5)**

200A.1Ba.2 Chaparral with both *Adenostoma* important and *Ceanothus cuneatus* important (each > 30% relative cover)= **A.2.N.c ?? ADENOSTOMA FASCICULATUM-CEANOTHUS CUNEATUS ALLIANCE** (Gordon & White, 1994). Only one association in the mapping area = **Chamise-Wedgeleaf ceanothus Shrubland [*Adenostoma fasciculatum*-*Ceanothus cuneatus* Shrubland] (n=5)**

200A.1Bb Chaparral with an *Arctostaphylos* species (manzanita) dominant

200A.1Bb.1 Scrub dominated by *Arctostaphylos patula* (greenleaf manzanita) = **III.A.2.N.c.35 ARCTOSTAPHYLOS PATULA SHRUBLAND ALLIANCE**

Only one association in mapping area but see also *Quercus vaccinifolia* Alliance. Most stands are seral to tree-dominated vegetation and have variable composition of subordinate shrubs and young trees = **Greenleaf manzanita Shrubland [*Arctostaphylos patula* Shrubland] (n=17)**

200A.1Bb.2 Chaparral dominated by *Arctostaphylos viscida* (whiteleaf manzanita) with variable mixtures of associated shrubs all covering less than 30 percent of the

total shrub cover = **III.A.2.N.c.37 ARCTOSTAPHYLOS VISCIDA SHRUBLAND ALLIANCE**

As with the *A. patula* alliance, there is a variety of expressions locally including stands that are pure or mostly pure *A. viscida*, stands that have some openings where mountain misery (*Chamaebatia foliolosa*) may occur in the understory, or stands with a small percentage of other shrubs such as wedgeleaf ceanothus (*Ceanothus cuneatus*), or bush poppy (*Dendromecon rigida*). These variants are likely a result of fire and other disturbance history and are characterized by wide ranging species that do not serve well as indicators of associations. These variants have all been subsumed into a single association at this time.

200A.1Bb.2a Stands with *A. viscida* as principal species = **Whiteleaf manzanita Shrubland [*Arctostaphylos viscida* Shrubland] (n=9)**

200A.1Bc Scrubs with evergreen sclerophyllous *Ceanothus* species dominant or important.

200A.1Bc.1 Scrub with *Ceanothus cordulatus* (mountain whitethorn or snowbush) as the dominant. Generally occurs in disturbed openings in coniferous forest within ecological Zone III = **III.A.2.N.c.10 CEANOTHUS CORDULATUS SHRUBLAND ALLIANCE**

Only one association present. May include other species of shrubs in relative cover less than 40 percent = **Mountain whitethorn Shrubland [*Ceanothus cordulatus* Shrubland] (n=13)**

200A.1Bc.2 Scrub with *Ceanothus cuneatus* (buckbrush, wedgeleaf ceanothus) dominant generally occurs in ecological Zones I and II = **III.A.2.N.c.12 CEANOTHUS CUNEATUS SHRUBLAND ALLIANCE**

Only one association identified. Other shrub species may be present in relatively low cover, including *Arctostaphylos viscida*, *Toxicodendron diversilobum* and *Keckiella breviflora*. *Bromus* spp. Typically with high relative cover as a group include *B. madritensis*, *B. hordeaceus*, *B. arenarius*, *B. diandrus* and *B. tectorum* = **Wedgeleaf buckbrush/Bromes Shrubland [*Ceanothus cuneatus*/Bromus spp. Shrubland] (n=5)**

200A.1Bc.3 Scrub with *Ceanothus leucodermis* (whitethorn) dominant or conspicuous. Locally distributed on southerly facing slopes in Zone I in Merced River Canyon. Often mixed with shrubby *Quercus wislizeni*, *Aesculus californica*, and *Toxicodendron diversilobum* = **III.A.2.N.c.14 CEANOTHUS LEUCODERMIS SHRUBLAND ALLIANCE**

No associations defined; however, the two plots sampled were largely *Ceanothus leucodermis* and *Toxicodendron diversilobum*. (n=2)

200A.1Bc.4 Scrub with *Ceanothus velutinus* (tobacco brush) dominant or codominant. Usually on east side of Sierra Crest surrounded by *Artemisia tridentata*

or other eastside alliances = **III.A.2.N.c.34 CEANOTHUS VELUTINUS SHRUBLAND ALLIANCE**

200A.1Bc.4a *Ceanothus velutinus* dominant overstory shrub with a mixture of other eastside shrubs and herbs including *Artemisia tridentata* and *Wyethia mollis*, none acting as strong indicators = **Tobacco brush Shrubland [*Ceanothus velutinus* Shrubland] (n=4)**

200A.1Bc.4b *Ceanothus velutinus* dominant, mixed with *Prunus emarginata* (bitter cherry) usually in concavities above 8,000 feet where snow accumulates in winter = **Tobacco brush-Bitter cherry-Big sagebrush Shrubland [*Ceanothus velutinus*-*Prunus emarginata*- *Artemisia tridentata* Shrubland] (n=3)**

200A.1Bd *Chrysolepis sempervirens* (bush chinquapin) dominant = **III.A.2.N.c.9 CHRYSOLEPIS SEMPERVIRENS SHRUBLAND ALLIANCE (aka *Castanopsis sempervirens* alliance)**

Only one association known from the mapping area. Characterized by strong dominance (> 60% relative cover) of *Chrysolepis sempervirens* = ***Chrysolepis sempervirens* Shrubland [Bush chinquapin Shrubland] (n=7)**

200A.1Be Scrub with oaks (*Quercus* spp.) dominant.

200A.1Be.1 Low elevation westside chaparral dominated by scrubby *Quercus wislizeni* (interior live oak). Mixes with typical mesophytic chaparral associates such as *Aesculus californica* and *Toxicodendron diversilobum* = **III.A.2.N.c.33 QUERCUS WISLIZENI SHRUBLAND ALLIANCE**

Insufficient information from the two plots to distinguish associations (n=2). Several such stands exist in Zone I in recently burned areas (e.g., in the El Portal area). The influence of fire history on the structure and composition of these stands remains to be seen. Tree and scrub versions of *Q. wislizeni* stands may best be placed in the same alliance ultimately.

200A.1Be.2 Scrub of Zones II to IV with *Quercus vaccinifolia* dominant or important. If not dominant, then shared dominance with *Arctostaphylos patula* = **III.A.2.N.c.31 QUERCUS VACCINIFOLIA SHRUBLAND ALLIANCE**

200A.1Be.2a *Q. vaccinifolia* overwhelmingly dominant with no other substantial shrub cover = **Huckleberry oak Shrubland [*Quercus vaccinifolia* Shrubland] (n=2)**

200A.1Be.2b *Q. vaccinifolia* and *Chrysolepis sempervirens* may each range from 30 to 60 percent relative cover = **Huckleberry oak-Bush chinquapin Shrubland [*Quercus vaccinifolia*-*Chrysolepis sempervirens* Shrubland] (n=4)**

200A.1Be.2c Both *Q. vaccinifolia* and *Arctostaphylos patula* dominant or important in shrub canopy (each 30–60% relative cover) = **Huckleberry oak-Greenleaf manzanita Shrubland [*Quercus vaccinifolia*-*Arctostaphylos patula* Shrubland] (Sawyer & Thornburgh) (n=10)**

200A.1Bf Scrubs with *Cercocarpus* spp. (mountain mahogany species) predominant. Not typically considered scrub (see tree-dominated keys) but included here to reduce ambiguity about short stature stands.

200A.1Bf.1 Canopy dominated by the small tree or large shrub *Cercocarpus ledifolius*. Occurs principally in ecological Zones VII and VIII on the east side of the crest on steep rocky sites, associated with *Artemisia tridentata* (big sage) and other Great Basin species = **II.A.5.N.a.1 CERCOCARPUS LEDIFOLIUS WOODLAND ALLIANCE**

Note: Stands vary, although most fall into woodland with less than 60 percent canopy cover, there are two unclassifiable plots characterized by high canopy cover. Only one association defined locally with *Symphoricarpos rotundifolia* (round-leaved snowberry) as the characteristic understory species = **Curleaf mountain mahogany/Roundleaf snowberry Shrubland [*Cercocarpus ledifolius*/*Symphoricarpos rotundifolia* Shrubland] (n=8)**

200A.1Bf.2 A short woodland or tall scrub of the west side of the Sierra Crest in ecological Zones I and II with *Cercocarpus betuloides* (aka *C. montanus*) as the dominant overstory species; may mix with lesser cover of other chaparral shrubs including *Arctostaphylos viscida* and *Ceanothus cuneatus* = **II.A.5.N.a.2 CERCOCARPUS MONTANUS (*C. betuloides*, Hickman, 1993) WOODLAND ALLIANCE**

A single association identified in the mapping area = **Birch-leaf mountain mahogany Shrubland [*Cercocarpus betuloides* var. *betuloides* Shrubland] (n=5)**

200A.1C Microphyllous (leaf surface area generally smaller than 1 cm²) evergreen soft-leaved species of shrubs comprise the largest proportion of shrub canopy. III.A.4.N.a Microphyllous evergreen shrubland

200A.1Ca An *Artemisia* species comprises all or most of the shrub canopy.

200A.1Ca.1 *Artemisia cana* is the dominant shrub. Scrubs of moist meadow and riparian edges on east side of Zone VIII. Although this is a winter deciduous species and is more properly keyed in the deciduous shrub key (200B), it is also included here to avoid confusion = **III.A.4.N.a.15 ARTEMISIA CANA SHRUBLAND ALLIANCE**

Insufficient plot data to completely describe, but two plots suggest an *Artemisia cana*/*Iris missouriensis*-*Juncus balticus* association in meadows subjected to long-term grazing.

200A.1Ca.2 *Artemisia tridentata* ssp. *vaseyana* (mountain big sagebrush) is dominant, usually occurs in subalpine to alpine zone adjacent to moist meadows = **III.A.4.N.a.19 ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE**

Only one association known from the area = **Mountain big sagebrush/Shorthair sedge Shrubland** [*Artemisia tridentata* ssp. *vaseyana*/*Carex exserta* Shrubland] (meadow edge subalpine aka artr/cafi) (n=3)

200A.1Ca.3 *Artemisia tridentata* (largely ssp. *tridentata*, but taxonomy is somewhat unclear and ssp. *wyomingensis* and ssp. *vaseyana* may be present in some samples) is strongly dominant. *Purshia tridentata*, if present, less than 5 percent relative cover. Note: Sufficient samples exist only for one association; however, several may exist. Most of the scrub with *A. tridentata* locally is best considered in the *Purshia tridentata* alliance (200A.1D) = **III.A.4.N.a.17 ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE**

200A.1Ca.3a *Artemisia tridentata* and *Ericameria nauseosus* present and conspicuous in stand with no other major shrub species (although only one sample locally may be equivalent to widespread type in Great Basin). Need more plots locally = **Big sagebrush-Rubber rabbitbrush Shrubland** [*Artemisia tridentata*-*Ericameria nauseosus* Shrubland] (in national classification for NV, ID, OR, WA)

200A.1Ca.3b. *Artemisia tridentata* dominant over sparse understory including the grass *Achnatherum hymenoides*; insufficient samples currently for association description = **Big sagebrush/Indian ricegrass Shrubland** [*Artemisia tridentata*/*Achnatherum hymenoides* Shrubland] (n=2)

200A.1Ca.3c *Artemisia tridentata* as dominant with the perennial herb *Monardella odoratissima* in openings along with other shrubs and herbs that occur in low cover. This appears to be the most widespread; *A. tridentata* association locally = **Big sagebrush/Mountain pennyroyal Shrubland** [*Artemisia tridentata*/*Monardella odoratissima* Shrubland] (n=3)

200A.1Cb *Purshia tridentata* (antelope bitterbrush) occurs with or without big sagebrush (*Artemisia tridentata*) in shrub layer. In general *Purshia* is a codominant or dominant, but stands occur where *A. tridentata* is in greater cover than *Purshia*. Data analysis suggests that all stands with significant (ca. > 5% absolute cover) *Purshia* should be grouped together in one alliance = **III.A.4.N.a.13 PURSHIA TRIDENTATA SHRUBLAND ALLIANCE**

200A.1Cb.1 *Purshia tridentata* and *Artemisia tridentata* co-occur throughout stands with *Tetradymia canescens* (horsebush) present = **Antelope bitterbrush-Big sagebrush-Tetradymia Shrubland** [*Purshia tridentata*-*Artemisia tridentata*-*Tetradymia canescens* Shrubland] (n=5)

200A.1Cb.2 *Purshia tridentata* and *Artemisia tridentata* co-occur with Indian ricegrass (*Achnatherum hymenoides*) in the openings in the shrub understory = **Antelope bitterbrush-Big sagebrush/Indian ricegrass Shrubland** [*Purshia tridentata*-*Artemisia tridentata*/*Achnatherum hymenoides* Shrubland] (n=3)

200A.1Cb.3 *Purshia tridentata* dominates with little *A. tridentata* over scattered understory with Nevada needlegrass = **Antelope bitterbrush-Big sagebrush/Nevada needlegrass-(Nelson's needlegrass) Shrubland** [*Purshia tridentata*-*Artemisia tridentata*/*Achnatherum nevadense*-(*Achnatherum nelsonii*) Shrubland] (n=3)

200A.1Cb.4 *Purshia tridentata* and *Artemisia tridentata* co-dominate stands with the subshrub sulphurflower (*Eriogonum umbellatum*) = **Antelope bitterbrush-Big sagebrush/Sulphurflower Shrubland** [*Purshia tridentata*-*Artemisia tridentata*/*Eriogonum umbellatum* Shrubland] (n=6)

200A.1Cb.5 *Purshia tridentata* co-occurs with *Artemisia tridentata* and with the viney round-leaved snowberry (*Symphoricarpos rotundifolia*). Widespread on upper slopes in Zones VII and VIII = **Antelope bitterbrush-Big sagebrush-Roundleaf snowberry Shrubland** [*Purshia tridentata*-*Artemisia tridentata*-*Symphoricarpos rotundifolia* Shrubland] (n=3)

200A.1Cc Shrub canopy dominated by the palmately divided shrub of moist alpine and subalpine conditions *Potentilla fruticosa* (aka shrubby cinquefoil or *Pentaphylloides floribunda*). Stands are usually small and associated with meadows or rivulets in ecological Zones IV, V, and VI. Shrub canopy is variable and may average less than 10 percent, thus this is also keyed in the herbaceous key = **V.A.7.N.g.2 PENTAPHYLLOIDES FLORIBUNDA SHRUB HERBACEOUS ALLIANCE**

Only one association defined, but some variation shown including a stand sampled with *Carex exserta* and *Trisetum spicatum* and another with *Sedum roseum* and *Selaginella watsonii*. The one association has *Danthonia intermedia* as the characteristic species in the herbaceous layer = **Shrubby cinquefoil/Intermediate oat grass Herbaceous Vegetation** [*Pentaphylloides floribunda*/*Danthonia intermedia* Herbaceous Vegetation] (n=3)

200A.2 Temperate cold deciduous shrubland. Deciduous species generally contribute greater than 75 percent of the total shrub and/or tree cover.

200A.2A Willows (*Salix* sp.) are not important in the shrub canopy.

200A.2Aa *Artemisia cana* is the dominant shrub. Scrubs of moist meadow and riparian edges on east side of Zone VIII. = **III.A.4.N.a.15 ARTEMISIA CANA SHRUBLAND ALLIANCE**

Insufficient plot data to completely describe, but two plots suggest an *Artemisia cana*/*Iris missouriensis*-*Juncus balticus* association in meadows subjected to long-term grazing.

200A.2Ab The winter deciduous deerbrush (*Ceanothus integerrimus*) is the dominant shrub, usually in recently burned openings in ecological Zone II = **III.B.2.N.a.2 CEANOTHUS INTEGERRIMUS SHRUBLAND ALLIANCE**

200A.2Ab.1 *Ceanothus integerrimus* dominates with *Arctostaphylos viscida* as the principal subordinate shrub. In some stands *Arctostaphylos mewukka* (Mewuk manzanita) may be present = **Deer brush-Whiteleaf manzanita Shrubland** [*Ceanothus integerrimus*-*Arctostaphylos viscida*-(*Arctostaphylos mewukka*) Shrubland] (n=3)

200A.2Ab.2 *Ceanothus integerrimus* dominates with *Ceanothus cordulatus* (mountain whitethorn) as the major subordinate species. Insufficient plot data to

define association but suggests an upper elevation Zone II/Zone III association following fire in coniferous forest = **Deer brush-Mountain whitethorn Shrubland** [*Ceanothus integerrimus*-*Ceanothus cordulatus* Shrubland] poorly described (n=2)

200A.2Ac Oceanspray or rock spiraea (*Holodiscus discolor*) dominates. Usually sparse to moderately open shrublands of rocky outcrops in ecological Zones III, IV, VII, and VIII = **III.B.2.N.a.8 HOLODISCUS DISCOLOR SHRUBLAND ALLIANCE**

Only one association is well sampled, it occupies open granitic bedrock and slab sites where small stands occur in crevices and other openings among the rocks = **Oceanspray/Sierra stonecrop-Parsley fern Shrubland** [*Holodiscus discolor*/*Sedum obtusatum* ssp. *boreale*-*Cryptogramma achrostoides* Shrubland] (n=4)

Other *Holodiscus* stands occur on the east side of the Sierra Crest at high elevations in Zone VII. There are insufficient samples for description (alliance only) (n=2) eastside

200A.2Ad Bitter cherry (*Prunus emarginata*) is the dominant shrub. Stands occur primarily in ecological Zones II, III, and VII = **III.B.2.N.a ?? PRUNUS EMARGINATA SHRUBLAND ALLIANCE**

Note: Stands are typically more mesophytic than other "montane chaparral" or scrubs, usually occupying recently disturbed concavities in drier environments or easterly to northerly slopes that accumulate significant snow. Insufficient plot data to define multiple associations. One general association defined = **Bitter cherry Shrubland** [*Prunus emarginata* Shrubland] (n=3)

200A.2Ae The winter deciduous shrub oak *Quercus garryana* var. *breweri* (brewer oak, shin oak) dominates usually on northerly slopes in the interface between ecological Zones I and II. Insufficient plot for description of association = **III.B.2.N.a.12 QUERCUS GARRYANA var. BREWERI SHRUBLAND ALLIANCE (no plots)**

200A.2Af Uncertain vegetation type dominated by mountain red elderberry (*Sambucus racemosa*). Generally very local in active talus in Zones V and VI often associated with the sedge *Carex congdonii*. It is treated here because *Sambucus racemosa* is the visual dominant, although the data suggests that this is an association of the **CAREX CONGDONII-ARNICA AMPLEXICAULIS HERBACEOUS ALLIANCE** (Taylor, 1984) (also keys under herbaceous alliances) = **Mountain red elderberry/Congdon's sedge Shrubland** [*Sambucus racemosa*/*Carex congdonii* Shrubland] (Taylor, 1984) (n=1)

200A.2B Stands with a willow (*Salix*) species as the dominant shrub

200A.2Ba Narrow-leaf willow (*Salix exigua*) the dominant shrub. Occurs along creeks and seeps on east side of study area in Zone VIII. May also occur in Zone I at lowest elevations = **III.B.2.N.d.6 SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND ALLIANCE**

Currently no adequate plot data for association-level description; possibly a *Salix exigua*/*Juncus* association; occurs on the eastside creeks (n=2)

200A.2Bb Sierra willow (*Salix eastwoodiae*) main canopy species, forms a low scrub in high elevation moist to wet meadows and streamsides Zones IV and V; may include both

temporarily and seasonally flooded sites = **III.B.2.N.e.20 SIERRA WILLOW (ALLIANCE) (SALIX EASTWOODIAE)**

Currently includes one general association that may be mixed with shrubs such as *Salix orestra* (grayleaf Sierra willow), subshrubs such as *Vaccinium caespitosum* (bilberry), and herbs such as *Carex scopulorum* (Rock Mountain sedge) = **Sierra willow Shrubland [*Salix eastwoodiae* Shrubland] (n=10) (defined by Potter 2000 ms)**

200A.2Bc As currently defined, an extremely variable alliance defined by dominance of arroyo willow (*Salix lasiolepis*). May occur on lower to midslope west and east sides of study area as well as occasionally up to Zone III or IV = **III.B.2.N.d.36 SALIX LASIOLEPIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE**

Note: Currently few plots and no well-defined associations. Clearly variable associates from low elevation west side (*Quercus chrysolepis* and *Calycanthus occidentalis*) to high elevation eastside riparian with *Pinus contorta* and *Juniperus occidentalis*.

200A.2Bd Stands dominated by Lemmon's willow (*Salix lemmonii*). Stands usually riparian along rivulets and streams in ecological Zones IV, V, and VII in subalpine and alpine of east and west sides = **III.B.2.N.e.?? SALIX LEMMONII NEW ALLIANCE (n=3)**

Currently one general association defined for area = **Lemmon's willow Shrubland [*Salix lemmonii* Shrubland] (n=3) (Potter 2000 ms)**

200A.2Be Dusky willow (*Salix melanopsis*) is the dominant shrub, scattered in area at mid to upper elevations of west side mostly Zones III and IV = **III.B.2.N.e.?? SALIX MELANOPSIS SEASONALLY FLOODED SHRUBLAND ALLIANCE**

Currently one association defined by the dominance of *Salix melanopsis* = **Dusky willow Shrubland [*Salix melanopsis* Shrubland] (n=3) (Potter plots)**

200A.2Bf Stands dominated by the grayleaf Sierra willow (*Salix orestera*). Upper elevation meadows and streamsides mostly in Zones IV, V, VI, and VII = **III.B.2.N.e ?? SALIX ORESTERA SEASONALLY FLOODED SHRUBLAND ALLIANCE (Taylor, 1984).**

The following three associations are defined by Taylor (1984) from the study area and are arranged in order from wet to moist.

200A.2Bf.1 Grayleaf Sierra willow dominant shrub with swamp or meadow onion (*Allium validum*) conspicuous in understory = **Grayleaf Sierra willow/Meadow onion Shrubland [*Salix orestera*/*Allium validum* Shrubland] (Taylor, 1984) (n=1)**

200A.2Bf.2 Grayleaf Sierra willow dominant shrub with arrowhead butterweed conspicuous tall herb = **Grayleaf Sierra willow/Arrowhead butterweed Shrubland [*Salix orestera*/*Senecio triangularis* Shrubland] (Taylor and Major & Taylor, 1977) (n=3)**

200A.2Bf.3 Grayleaf Sierra willow dominant shrub with shorthair reedgrass (*Calamagrostis breweri*) as the major understory associate = **Grayleaf Sierra willow/Shorthair reedgrass Shrubland** [*Salix orestera/Calamagrostis breweri* Shrubland] (Taylor, 1984) (n=3)

200A.2Bg Tea-leaf willow (*Salix planifolia*) dominant low shrub. Generally wet or saturated stream sides, tarn edges, or wet meadows of Zones IV and V = **III.B.2.N.e.23 SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE**

Currently two associations defined in area.

200A.2Bg.1 Tea-leaf willow dominant with mixes of other species including *Salix eastwoodiae*, *Vaccinium caespitosum*, *Kalmia polifolia*, and *Polygonum bistortoides* = **Tea-leaf willow Shrubland** [*Salix planifolia* Shrubland] (n=5)

200A.2Bg.2 Tea-leaf willow occurs along rivulets in subalpine and alpine meadows with Rocky Mountain sedge (*Carex scopulorum*) = **Tea-leaf willow-Rocky Mountain sedge Shrubland** [*Salix planifolia/Carex scopulorum* Shrubland] (Taylor, 1984) (n=1)

200B Dwarf-shrubland. Low-growing shrubs and/or trees usually under 0.5 meter tall, individuals or clumps not touching to interlocking (generally forming greater than 25% cover). **Note:** If you encounter unusually low shrubs of typically tall species, you should first try to key these in the shrub key (200A).

200B.1 Evergreen dwarf-shrubland. Evergreen species generally contribute greater than 75 percent of the total dwarf-shrub and/or tree cover.

200B.1A For stands with an *Artemisia* species as the dominant subshrub also see 200A under microphyllous scrubland for occasional tall stands of *A. cana* (a deciduous species) or other *Artemisia tridentata* over 0.5 meter in height.

200B.1Aa *Artemisia arbuscula* (low sagebrush) dominant or important subshrub. Usually on east side of Zone VII or VIII on upper slopes or poor, shallow, and/or rocky soils = **IV.A.1.N.a.13 ARTEMISIA ARBUSCULA DWARF-SHRUBLAND ALLIANCE**

200B.1Aa.1 Low sagebrush (*Artemisia arbuscula*) and prickly phlox (*Leptodactylon pungens*) are common subshrubs but may occur with other subshrubs. Usually on shallow rocky soils of mid or upper slopes in Zone VII = **Low sagebrush/Prickly phlox Dwarf-Shrubland** [*Artemisia arbuscula/Leptodactylon pungens* Dwarf-Shrubland] (n=4)

200B.1Aa.2 Low sagebrush mixed with other low perennial herbs including *Eriogonum microthecum*. Occurs on localized shallow soils of Zone VIII surrounded by *A. tridentata* and *Purshia tridentata* alliance stands. (Was called *Artemisia arbuscula* /*Poa fendleri* association in intermediate classification) = **Low sagebrush/Slender buckwheat Dwarf-Shrubland** [*Artemisia arbuscula/Eriogonum microthecum* Dwarf-Shrubland] (n=3)

200B.1Ab Low scrub dominated by Rothrock sagebrush (*Artemisia rothrockii*). Generally uncommon in the area and probably restricted to metamorphic and volcanic substrates in Zones IV and VII = **IV.A.2.N.a.2 ARTEMISIA ROTHROCKII DWARF-SHRUBLAND ALLIANCE** **Note:** There has been some confusion between this alliance and the *Artemisia tridentata* ssp. *vaseyana* alliance. Thus the identification of the putative association below

may be in question. All stands seem to be adjacent to moist meadows in the subalpine zone of the east side.

200B.1Ab.1 *Artemisia rothrockii* occurs in moist or drying meadow edges in Zone VII on metamorphics associated with mountain pennyroyal (*Monardella odoratissima*) = **Rothrock's sagebrush/Mountain pennyroyal Dwarf-Shrubland** [*Artemisia rothrockii*/*Monardella odoratissima* Dwarf-Shrubland] (Taylor, 1984)

200B.1B Stands of subshrubs without *Artemisia* present or dominant

200B.1Ba Stands dominated by mountain misery (*Chamaebatia foliolosa*). Usually occupies small openings that have clearly been recently disturbed by fire or logging within forest and woodland alliances of ecological Zone II. This type is not formally considered an alliance at this time but is included as a distinct small patch matrix that may be identified by field investigation. = **IV.A.1.N.a.?? CHAMAEBATIA FOLIOLOSA DWARF-SHRUBLAND** (informally defined due to early seral and small patch size) (n=4)

One association represented locally = **Mountain misery-Whiteleaf manzanita Dwarf-Shrubland** [*Chamaebatia foliolosa*-*Arctostaphylos viscida* Dwarf-Shrubland]

200B.1Bb An alpine association of the *Calamagrostis purpurascens* alliance (see 300A.1Bb.1) with the subshrub *Chrysothamnus parryi* ssp. *monocephalus* present in stands = **Purple reedgrass-Parry rabbitbrush-Granite gilia Dwarf-Shrubland** [*Calamagrostis purpurascens*-*Chrysothamnus parryi* ssp. *monocephalus*-*Leptodactylon pungens* Dwarf-Shrubland] (Taylor, 1984) (n=1)

200B.1Bb Stands with the showy flowered composite herb *Hulsea algida* conspicuous. Local stands are usually associated with scattered subshrubs of *Ericameria discoidea* (alpine goldenbush) and with the herb *Phacelia hastata* ssp. *compacta*. Usually rocky scree areas on mid and upper slopes in alpine Zones V and VI = **V.B.2.N.b.?? ALPINE HULSEA ALLIANCE** (Taylor, 1984) (see also 300A.2Ad)

One association represented locally = **Alpine hulsea-Alpine goldenbush-Alpine phacelia Dwarf-Shrubland** [*Hulsea algida*-*Ericameria discoidea*-*Phacelia hastata* ssp. *compacta* Dwarf-Shrubland] (Taylor, 1984) (n=1)

200B.2 Deciduous dwarf-shrubland. Deciduous species generally contribute greater than 75 percent of the total dwarf shrub cover (also see *Artemisia cana* under 200A).

200B.2A *Vaccinium* spp., *Kalmia polifolia* (mountain laurel), or *Spiraea densiflora* dominant or important in the stand.

200B.2Aa An uncertain alliance of the subalpine and alpine zones of moist meadows with the very low growing *Vaccinium caespitosum* (Sierra bilberry) and graminoids as the principal cover = **IV.B.2.N.a.2 VACCINIUM (CAESPITOSUM, SCOPARIUM) DWARF-SHRUBLAND ALLIANCE**

A single association has been defined with *V. caespitosum* sharing cover with shorthair sedge (*Carex exserta*) = **Sierra bilberry/Shorthair sedge Dwarf-Shrubland** [*Vaccinium caespitosum/Carex exserta Dwarf-Shrubland*] (n=4)

200B.2Ab The slightly taller subshrub *V. uliginosum* (*V. occidentale*) the dominant subshrub. Occurs in wet meadows in Zones III and IV often with Sphagnum sp. or other fen or saturated meadow soil species = **IV.B.2.N.d.2 VACCINIUM ULIGINOSUM SATURATED DWARF-SHRUBLAND ALLIANCE**

Includes one defined association = **Western blueberry Dwarf-Shrubland** [*Vaccinium uliginosum Dwarf-Shrubland*] (n=3)

200B.2Ac Stands of low lying wet meadows within Zones IV and V usually surrounded by larger stands of *Calamagrostis breweri* alliance at slightly less damp conditions. Usually contains substantial cover of the very low creeping subshrub *Kalmia polifolia* (mountain laurel). *Carex nigricans* is diagnostic but may be in relatively low cover = **V.A.5.N.k.57 CAREX NIGRICANS SEASONALLY FLOODED HERBACEOUS ALLIANCE** (see also 300A.1Bb.1b.4)

One association defined by Taylor (1984) = **Blackish sedge-Mountain laurel Dwarf-Shrubland** [*Carex nigricans/Kalmia polifolia Dwarf-Shrubland*] (Taylor, 1984) < MMU (n=1)

200B.2Ac *Spiraea splendens* [*S. densiflora*, Hickman 1993] is the predominant shrub or subshrub in the stand. Usually with *Penstemon newberryi* present, moist rocky settings at relatively high elevations = **Sierra spiraea/Mountain pride penstemon-Mountain jewelflower Dwarf-Shrubland** [*Spiraea splendens/Penstemon newberryi-Streptanthus tortuosus Dwarf-Shrubland*] (Taylor, 1984) (n=7) see also 300A.2Ba.3a

200B.2B A dwarf willow dominant or conspicuous

200B.2Ba *Salix arctica* (arctic willow) conspicuous creeping woody plant mixed with short forbs and graminoids of sloping alpine meadow and flush areas = **IV.B.2.N.b.2 SALIX ARCTICA DWARF-SHRUBLAND ALLIANCE**

One association recognized with the following four species: *Salix arctica*, *Calamagrostis breweri*, *Vaccinium caespitosum*, and *Antennaria media* conspicuous in each stand = **Arctic willow/Shorthair reedgrass-Sierra bilberry-Pussytoes Dwarf-Shrubland** [*Salix arctica/Calamagrostis breweri-Vaccinium caespitosum-Antennaria media Dwarf-Shrubland*] (n=9)

200B.2Bb Stands characterized by *Salix reticulata* (snow willow). Only several stands known on metamorphic substrates in alpine zone of the crest or the eastern side of the crest. Insufficient plots for definition of local association = **IV.B.2.N.b.4 SALIX RETICULATA DWARF-SHRUBLAND ALLIANCE** (n=1)

DIVISION 300 VEGETATION CHARACTERIZED BY HERBACEOUS SPECIES

300A Herbaceous Vegetation. Graminoids and/or forbs (including ferns) generally forming greater than 10 percent cover with woody cover usually less than 10 percent. This division is broken into perennial graminoid, perennial herb/forb, and annual grass/herb/forb groups.

300A.1 Vegetation dominated by perennial grasses or grass-like species (including *Carex*, *Juncus*, *Typha*, or *Scirpus*). Graminoids, generally contributing to greater than 50 percent of relative cover. Broken into three groups of different average heights.

300A.1A Medium tall (about 0.75–1.5 meter tall) perennial vegetation with grasses (300A.1Aa) and/or sedges (300A.1Ab) or rushes (*Juncus* spp.) (300A.1Ac) dominant or conspicuous. Note: There are three main groups here based on the predominant families of grasses or graminoids represented.

300A.1Aa. Stands with grasses (*Poaceae*) dominant or conspicuous, may also have *Carex* spp. and broad-leaved herbs in lower numbers. Note: This group has five alliances characterized by different species of grass as the dominant and characteristic species.

300A.1Aa.1 *Elymus glaucus* (blue wildrye) dominant or conspicuous along with other graminoids, particularly the sedges *Carex lanuginosa* or *C. feta* or with the nonnative grass *Agrostis gigantea*. Found in moist to drying soil of meadow edges and openings in mesic forests typically within Zones II and III on the west side of the range or in Zone VII adjacent to meadows or riparian stands of trees and shrubs = **V.A.5.N.d. ?? ELYMUS GLAUCUS HERBACEOUS ALLIANCE**

300A.1Aa.1a. *Elymus glaucus* and *Carex lanuginosa* present, either may be dominant but both conspicuous. Westside meadows and meadow edges adjacent to forest or woodland stands = ***Elymus glaucus*-*Carex lanuginosa* Herbaceous Vegetation (n=4)** (see key to *Carex lanuginosa* at entry 300A.1Be)

300A.1Aa.1b *Elymus glaucus* and *Carex feta* both conspicuous, either may be dominant. Moist to drying meadows on west side in Zones III and IV = ***Elymus glaucus*-*Carex feta* Herbaceous Vegetation (n=3)**

300A.1Aa.2 The wetland grass *Glyceria elata* (tall mannagrass) conspicuous tall grass over a variable shorter herbaceous understory. These are usually small (< 0.5 ha) stands that occur in saturated to moist areas adjacent to permanent rivulets, freshets, and small streams primarily in Zone III (one major association defined) = **V.A.5.N.j. GLYCERIA ELATA TEMPORARILY FLOODED HERBACEOUS ALLIANCE ??**

A single association defined: *Glyceria elata* dominates along with the medium tall herb *Senecio triangularis* (arrowleaf butterweed) and a number of other subordinate herbaceous species including *Lotus oblongifolius* (stream deer vetch) = **Tall mannagrass Herbaceous Vegetation (*Glyceria elata* Herbaceous Vegetation) (n=6)**

300A.1Aa.3 *Calamagrostis canadensis* (Canadian reedgrass) the dominant overstory herbaceous species. Wetlands adjacent to streams and in wet meadows primarily in Zones III and IV = **V.A.5.N.k.39 CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

Note: There appears to be one variable association that includes several herbs in moderate to low frequency (*Scirpus microcarpus*, *Senecio scorzonella*, *Polygonum bistortoides*, and *Senecio triangularis*) = **Canadian reedgrass Herbaceous Vegetation [*Calamagrostis canadensis* Herbaceous Vegetation]** (n=6)

300A.1Aa.4 The tufted wetland bunchgrass *Deschampsia caespitosa* (tufted hairgrass) dominant or conspicuous in herbaceous canopy. Ranges in moist to wet meadows from Zone III to Zones V and VI = **V.A.5.N.k.47 DESCHAMPSIA CESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE**

Note: The associations have been redefined from the intermediate classification. Other associations may be present locally, and further analysis may indicate individual alpine, subalpine, and montane associations; however, currently the data suggests only a single variable association with the following two characteristic species.

Tufted hairgrass-American bistort Herbaceous Vegetation [*Deschampsia caespitosa*-*Polygonum bistortoides*-(*Senecio scorzonella*) Herbaceous Vegetation] (n=8) that now includes the former tufted hairgrass-Coville ragwort (*Deschampsia caespitosa*-*Senecio covillei*) association (Benedict, 1983)], the former tufted hairgrass-Brewer bittercress association (*Deschampsia caespitosa* *Cardamine breweri*) (Benedict, 1983), the tufted hairgrass-Longstalk clover (*Deschampsia caespitosa*-*Trifolium longipes*) association (Ratliff, 1982, 1985), and the tufted hairgrass-Northern goldenrod (*Deschampsia caespitosa*-*Solidago multiradiata*) association (Taylor, 1984).

300A.1Aa.5 The introduced moist meadow grass *Poa pratensis* (Kentucky bluegrass) is the dominant. Usually associated with meadows in Zones II, III, and IV that have had a history of stock use = **V.A.5.N.k.?? POA PRATENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

Currently only one broad association defined = Kentucky bluegrass Herbaceous Vegetation [*Poa pratensis* Herbaceous Vegetation] (n=4) and also includes the intermediate classification unit *Poa pratensis*-*Achillea millefolium* (n=2)

300A.1Aa.6 The aquatic grass *Torreyochloa erecta* (spiked false mannagrass) forms an emergent layer or may dominate over a short layer of *Isoetes occidentalis* (western quillwort) = **Western quillwort-Spiked false mannagrass Herbaceous Vegetation [*Isoetes occidentalis*/*Torreyochloa erecta* Herbaceous Vegetation]** (Taylor, 1984) (n=1) of the *Isoetes* Alliance (see also 300A.2Ca)

300A.1Ab. Medium tall (about 0.75–1.5 meters tall) perennial vegetation with sedges (*Carex* spp.) dominant. Note: This group has seven alliances locally, each defined by a different dominant *Carex* species.

300A.1Ab.1 The medium tall moist to wet meadow sedge *Carex jonesii* is dominant, usually meadow edges in ecological Zones III, IV, and VII adjacent to willow thickets dominated by *Salix lemmonii* or *S. eastwoodiae* and associated with other ecologically similar herbaceous species including *Glyceria elata*, *Juncus nevadensis*, *Carex hoodii*, *Mimulus primuloides*, *Viola mackloskyi*, and *Arnica mollis*. As yet poorly defined in the study area but Potter (2000 ms) has plot data for several areas of

the Sierra = **V.A.5.N.j.?? CAREX JONESII TEMPORARILY FLOODED HERBACEOUS ALLIANCE (Potter type 2000 ms) [n=1]**

300A.1Ab.2 Small stands dominated by the medium tall *Carex spectabilis* (showy sedge) occur in alpine and subalpine settings around sheltered rocks, snowmelt streams, and below lingering snowbanks = **V.A.5.N.g.8 CAREX SPECTABILIS HERBACEOUS ALLIANCE**

Taylor (1984) mentions two associations from just east of the crest, but samples from our data are few.

300A.1Ab.2a *Senecio triangularis* (arrowhead butterweed) co-occurs with *Carex spectabilis* in relatively productive stringer meadows along streams and seeps wet throughout the growing season = **Showy sedge-Arrowleaf ragwort Herbaceous Vegetation [*Carex spectabilis*-*Senecio triangularis* Herbaceous Vegetation] (Taylor, 1984)**

300A.1Ab.2b *Carex spectabilis* dominates in a drier usually more rocky setting where moisture diminishes rapidly in later growing season often as a result of snowbank melt = **Showy sedge-Sibbaldia Herbaceous Vegetation [*Carex spectabilis*-*Sibbaldia procumbens* Herbaceous Vegetation] (Taylor, 1984) (n=1)**

300A.1Ab.3 *Carex utriculata* (beaked sedge) usually strongly dominates seasonally flooded and saturated edges of ponds, lakes, or slow-moving streams widespread in Zones III, IV, V, VI, and VII = **V.A.5.N.k.42 CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE**

One widespread association characterized by strong dominance of beaked sedge = **Beaked sedge Herbaceous Vegetation [*Carex utriculata* Herbaceous Vegetation] (Halpern, 1986; Taylor, 1984) (n=11)**

300A.1Ab.4 Usually small stands associated with low gradient streams and ponds in Zones III, IV, V, and VII, often adjacent to willow thickets or low gradient stream and pond sedge stands such as *Carex utriculata* association = **V.A.5.N.k.43 CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

No association firmly defined (n=2) some data from Potter plots (in 2000 ms)

300A.1Ab.5 The relatively tall *Carex lanuginosa* (wooly sedge) is dominant usually in moist areas adjacent to wet meadow/forest borders, often associated with *Elymus glaucus* (blue wildrye) and perhaps best considered a part of that alliance locally. The National Vegetation Classification suggests a slightly wetter moisture regime than is present in most Yosemite stands = **V.A.5.N.k.53 CAREX LANUGINOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE** see *Elymus glaucus* alliance. Many stands appear to be codominated by *Elymus glaucus* (blue wildrye) (n=0, but see 300A.1Aa.1)

300A.1Ab.6 The distinctive blue-green stemmed *Carex nebrascensis* (Nebraska sedge) dominates mostly in seasonally flooded meadows in Zones III, IV, VII, and VIII = **V.A.5.N.k.56 CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

One association defined = **Nebraska sedge Herbaceous Vegetation [*Carex nebrascensis* Herbaceous Vegetation]** (Beguin & Major, 1975) (n=3)

300A.1Ab.7 *Carex vesicaria* (inflated sedge) dominant. Stands ecologically similar to the physiognomically similar ***Carex utriculata* Herbaceous Vegetation** (300A.1Bc). (*C. vesicaria* distinguished by shorter more bristly spiklets than *C. utriculata*), usually in shallow water of lakes and ponds = **V.A.5.N.k. ?? CAREX VESICARIA SEASONALLY FLOODED ALLIANCE (UNDES.)** a single association defined by the dominant species.

Bristly (or inflated) sedge Herbaceous Vegetation [*Carex vesicaria* Herbaceous Vegetation] (n=8)

300A.1Ac. Medium tall (about 0.75–1.5 meter tall) perennial vegetation with rushes (*Juncus* spp.) dominant or conspicuous.

300A.1Ac.1 *Juncus balticus* (baltic rush) and/or *Juncus mexicanus* (mexican corkscrew rush) dominant or conspicuous, usually of the heavily grazed wet and moist meadows of the east side in Zones VII and VIII = **V.A.5.N.k.13 JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

One association defined with mixes of both Mexican and Baltic rush = **Baltic rush-(Mexican rush) Herbaceous Vegetation [*Juncus balticus* (*Juncus mexicanus*) Herbaceous Vegetation]** (n=3)

300A.1Ac.2 *Juncus nevadensis* (Nevada rush) dominant. Usually of wet meadows in Zone II or III. Data not well developed locally but assumed a type through more wide ranging sampling by Potter (1000) = **V.A.5.N.k. ?? JUNCUS NEVADENSIS HERBACEOUS ALLIANCE (Potter 2000 ms)**. No associations defined locally.

300A.1Ac.3 *Juncus mexicanus* dominant species, mostly on eastside grazed meadows. As yet poorly defined alliance, may be best to include within *Juncus balticus* as **V.A.5.N.k. ?? JUNCUS MEXICANUS HERBACEOUS ALLIANCE??** No associations defined (n=3)

300A.1B Short graminoid group. Major species in stands predominately short alpine or subalpine grasses or graminoid species generally less than 0.75 meter tall, usually of meadows or alpine slopes that dry earlier in the growing season than previous group. This group consists of three subgroups divided by whether the dominant is a grass, sedge, or rush.

300A.1Ba A short alpine or subalpine grass (*Poaceae*) dominant or conspicuous.

300A.1Ba.1 *Calamagrostis breweri* (shorthair reedgrass) common and conspicuous in stand (may not be dominant). High montane, subalpine, and alpine grasslands of moist to damp meadows and riparian edges = **V.A.5.N.g.1 CALAMAGROSTIS BREWERI HERBACEOUS ALLIANCE** (but see also *Carex scopulorum* alliance included below).

300A.1Ba.1a *Calamagrostis breweri* dominates with *Oreostemma alpigenum* (alpine aster, aka *Aster alpigenus*) the principal constant species.

Vaccinium caespitosum, if present, in low cover = **Shorthair reedgrass-Alpine aster Herbaceous Vegetation** [*Calamagrostis breweri*-*Aster alpigenus* Herbaceous Vegetation] (n=5) includes the former *Calamagrostis breweri*-Gentian-Alpine aster association (Ratcliff, 1982, 1985)

300A.1Ba.1b *Calamagrostis breweri* codominates with *Vaccinium caespitosum* (Sierra bilberry) usually slightly drier settings than the former association = **Shorthair reedgrass-Bilberry Herbaceous Vegetation** [*Calamagrostis breweri*-*Vaccinium caespitosum* Herbaceous Vegetation] (Taylor, 1984) (n=13)

300A.1Ba.1c *Calamagrostis breweri* dominates with *Trisetum spicatum* (spike trisetum grass) averaging 1–7 percent cover = **Shorthair reedgrass-Spike trisetum Herbaceous Vegetation** [*Calamagrostis breweri*-*Trisetum spicatum* Herbaceous Vegetation] (n=4)

300A.1Ba.1d A poorly defined type described from The Harvey Monroe Hall Research Natural Area with near equal cover of *Calamagrostis breweri*, *Juncus drummondii*, and at least in some cases *Ptilagrostis kingii* = **Shorthair reedgrass-Drummond rush Herbaceous Vegetation** [*Calamagrostis breweri*-*Juncus drummondii* Herbaceous Vegetation] (Taylor, 1984) (n=1)

300A.1Ba.1e Stands usually relatively narrow fringes associated with low gradient snowmelt streams and small tarn edges in Zones IV, V, and VI. *Carex scopulorum* (Rocky Mountain sedge) is usually dominant but may only be conspicuous and codominant with *Calamagrostis breweri* in some stands = **V.A.5.N.k.59 CAREX SCOPULORUM SEASONALLY FLOODED HERBACEOUS ALLIANCE**

300A.1Ba.1e.1 May have high *Calamagrostis breweri*, typically does not have significant cover of either *Pedicularis groenlandica* or *Eleocharis pauciflora* = **Rocky Mountain sedge Herbaceous Vegetation** [*Carex scopulorum* Herbaceous Vegetation] (n=6)

300A.1Ba.1e.2 *Pedicularis groenlandica* usually conspicuous in stands = **Rocky Mountain sedge-Elephant ears Herbaceous Vegetation** [*Carex scopulorum*-*Pedicularis groenlandica* Herbaceous Vegetation] (Taylor, 1984) (n=1)

300A.1Ba.1e.3 *Eleocharis pauciflora* (few-flowered spikerush) conspicuous in stand = **Rocky Mountain sedge-Few-flowered spikerush Herbaceous Vegetation** [*Carex scopulorum*-*Eleocharis pauciflora* Herbaceous Vegetation] (Taylor, 1984) (n=7)

300A.1Ba.2 *Danthonia intermedia* (intermediate oat grass) conspicuous, may occur with other grasses in lower cover including *Ptilagrostis kingii*, *Deschampsia caespitosa*, and *Calamagrostis breweri*. Stands of moist alpine and subalpine

meadows largely in Zones IV and V = **V.A.5.N.h.4 DANTHONIA INTERMEDIA HERBACEOUS ALLIANCE** (and also may include **V.A.7.N.g.2 PENTAPHYLLOIDES FLORIBUNDA SHRUB HERBACEOUS ALLIANCE**)

Those stands with an evenly distributed shrub overstory of *Pentaphylloides floribunda* (*Potentilla fruticosa*) are best treated in the **V.A.7.N.g.2 PENTAPHYLLOIDES FLORIBUNDA SHRUB HERBACEOUS ALLIANCE** (see **200A.1Cc**)

300A.1Ba.2a No sparse to intermittent overstory of *Pentaphylloides floribunda* (shrubby cinquefoil) present. A single association defined currently: *Danthonia intermedia* co-occurs with *Antennaria rosea* (alpine pussytoes) in moist meadows = **Intermediate oat grass-Alpine pussytoes Herbaceous Vegetation** [*Danthonia intermedia*-*Antennaria rosea* Herbaceous Vegetation] (n=4)

300A.1Ba.2b Has a sparse to intermittent overstory of *Pentaphylloides floribunda* (shrubby cinquefoil), of moist meadow and stream edges usually in alpine zones = **Shrubby cinquefoil/Intermediate oat grass Herbaceous Vegetation** [*Pentaphylloides floribunda* [aka *Potentilla fruticosa*]/*Danthonia intermedia* Herbaceous Vegetation] (n=3)

300A.1Ba.3 *Ptilagrostis kingii* (Sierra false needlegrass) is the dominant species of moist to wet meadows in subalpine and alpine zones. In well developed meadow systems such as Tuolumne Meadows, stands usually fall between *Carex exserta* alliance stands (drier), and *Calamagrostis breweri* alliance stands (wetter). *Danthonia intermedia* may be common but not constant. Other constant species include *Oreostemma alpigenum* (alpine aster) and *Polygonum bistortoides* (American bistort) = **V.A.5.N.k.?? PTILAGROSTIS KINGII SEASONALLY FLOODED HERBACEOUS ALLIANCE NO ASSOCIATION DEFINED** (n=7)

300A.1Ba.4 *Deschampsia caespitosa* (Tufted hairgrass) is a conspicuous tufted bunchgrass of moist to wet montane to alpine meadows = **V.A.5.N.k.47 DESCHAMPSIA CESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE**

300A.1Ba.4a Note: The associations have been redefined from the intermediate classification. Other associations may be present locally, and further analysis may indicate individual alpine, subalpine, and montane associations; however, currently the data suggests only a single variable association with the following two characteristic species.

Tufted hairgrass-American bistort Herbaceous Vegetation [*Deschampsia caespitosa*-*Polygonum bistortoides*-(*Senecio scorzonella*) Herbaceous Vegetation] (n=8) that now includes the former Tufted hairgrass-Coville ragwort (*Deschampsia caespitosa*-*Senecio covillei*) association (Benedict, 1983)], the former Tufted hairgrass-Brewer bittercress association (*Deschampsia caespitosa*-*Cardamine breweri*) (Benedict, 1983), the Tufted hairgrass-Longstalk clover (*Deschampsia caespitosa*-*Trifolium longipes*) association (Ratliff, 1982, 1985), and the Tufted hairgrass-Northern goldenrod (*Deschampsia caespitosa*-*Solidago multiradiata*) association (Taylor, 1984)

300A.1Ba.5 The introduced moist meadow grass *Poa pratensis* (Kentucky bluegrass) is the dominant. Usually associated with meadows in Zones II, III, and IV that have had a history of stock use = **V.A.5.N.k.?? POA PRATENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

Currently only one broad association defined = **Kentucky bluegrass Herbaceous Vegetation [Poa pratensis Herbaceous Vegetation]** (n=4) also includes interim classification unit *Poa pratensis-Achillea millefolium* (n=2)

300A.1Ba.6 Open stands in the xeric alpine zones (V and VI) with scattered small tufts of *Calamagrostis purpurescens* (purple reedgrass) interspersed between subshrubs or matted perennial herbs such as *Chrysothamnus parryi* ssp. *monocephalus*, *Eriogonum ovalifolium*, and *Leptodactylon pungens* = **V.A.5.N.g.9 CALAMAGROSTIS PURPURESCENS HERBACEOUS ALLIANCE**

300A.1Ba.6a The subshrub *Chrysothamnus parryi* ssp. *monocephalus* generally absent from stands = **Purple reedgrass-Granite gilia Herbaceous Vegetation [Calamagrostis purpurescens-Leptodactylon pungens Herbaceous Vegetation]** (Taylor, 1984) (n=4)

300A.1Ba.6b *Chrysothamnus parryi* ssp. *monocephalus* present in stands = **Purple reedgrass-Parry rabbitbrush-Granite gilia Herbaceous Vegetation [Calamagrostis purpurescens-Chrysothamnus parryi ssp. monocephalus-Leptodactylon pungens Herbaceous Vegetation]** (Taylor, 1984) (n=1)

300A.1Ba.7 Open stands in the xeric alpine zones (V and VI) with scattered small tufts of grass in association with subshrubs and low perennial matted herbs

300A.1Ba.7a *Elymus elymoides* (squirreltail), and or *Festuca minutiflora* in association with *Phlox covillei* and other low perennial matted herbs = **V.B.2.N.b.?? PHLOX COVILLEI-ELYMUS ELYMOIDES HERBACEOUS ALLIANCE** (Taylor, 1984)

300A.1Ba.7a.1 *Festuca minutiflora* and *Penstemon davidsonii* in association with *Phlox covillei* and *Elymus elymoides*. Xeric rocky fell fields = **Coville phlox-Squirreltail-Small-flowered fescue-Davidson penstemon Herbaceous Vegetation [Phlox covillei-Elymus elymoides-Festuca minutiflora-Penstemon davidsonii Herbaceous Vegetation]** (was *Festuca minutiflora-Penstemon davidsonii* (Taylor, 1984) (n=1)

300A.1Ba.7a.2 *Phlox covillei* and *Elymus elymoides* in association with the matted umbelliferous *Podistera*, but without *Erigeron pygmaeus*, fewer boulders and large rocks and more uniform xeric (well drained) substrate than former association = **Coville phlox-Squirreltail-Alpine podistera Herbaceous Vegetation [Phlox covillei-Elymus elymoides-Podistera nevadensis Herbaceous Vegetation]** (Taylor, 1984) (n=4)

300A.1Ba.7a.3 *Podistera nevadensis* and *Elymus elymoides* in association with *Erigeron pygmaeus*. Usually xeric ridgelines and open upper slopes in alpine zone = **Coville phlox-Squirreltail-Alpine podistera-Pygmy daisy Herbaceous Vegetation [*Phlox covillei*-*Elymus elymoides*-*Podistera nevadensis*-*Erigeron pygmaeus* Herbaceous Vegetation]** (Taylor, 1984) (n=8)

300A.1Ba.7b Scattered plants of *Arenaria* (*Minuartia*) *nuttallii* in association with *Achnatherum occidentale* (western needlegrass) and the subshrub *Ericameria discoidea* (alpine goldenbush) = **V.B.2.N.b.?? Nuttall sandwort-Alpine goldenbush Alliance (1)** (Taylor, 1984) (n=1)

Note: Field crews identified the *Arenaria* in this alliance as *A. kingii* ssp. *compacta* and not *A. nuttallii*.

300A.1Bb Grasses may be present but sedges (*Carex* sp.), rushes (*Juncus*), or spikerushes (*Eleocharis*) herbaceous forbs or subshrubs are dominant or conspicuous. There are three main divisions in this group broken down by genera dominants (*Carex* type, *Eleocharis* type, and *Juncus* type).

300A.1Bb.1 A *Carex* (sedge) dominant or conspicuous. Note: This group includes 12 alliances that are characterized by the dominance or conspicuousness of different species of *Carex*.

300A.1Bb.1a Stands characterized by short alpine or subalpine sedges (*Carex* spp.) of uplands or seasonally moist areas; stands are typically open or intermittent cover, not of low-lying productive meadows, streamsides, or lake margins

300A.1Bb.1a.1 Generally found in low-slope snowmelt areas in subalpine and alpine, usually moister and more sheltered than sites with *Carex exserta* alliance = **V.A.5.N.g.4 CAREX BREWERI HERBACEOUS ALLIANCE**

Currently only one association = **Brewer sedge Herbaceous Vegetation [*Carex breweri* Herbaceous Vegetation]** (n=4)

300A.1Bb.1a.2 *Carex exserta* (shorthair sedge) dominant or conspicuous cespitose sedge often forming large stands in dry to moist meadows, benches, and gently sloping areas in the subalpine and alpine zones throughout; common and conspicuous = **V.A.5.N.g.2 CAREX (FILIFOLIA, EXSERTA) HERBACEOUS ALLIANCE**

The following associations are arranged from driest to wettest.

300A.1Bb.1a.2a Stands occur in upland settings adjacent to meadows and on benches, in very well drained to moderately well drained sites = **Shorthair sedge-Pussypaws Herbaceous Vegetation [*Carex exserta*-**

***Cistanthe* spp. Herbaceous Vegetation (Burke, 1982)
(n=2)**

300A.1Bb.1a.2b Stands occur in moist meadows and upland borders of wet meadows, dry by the mid growing season = **Shorthair sedge-Heretic penstemon Herbaceous Vegetation [*Carex exserta*-*Penstemon heterodoxus* Herbaceous Vegetation] (n=10)**

300A.1Bb.1a.2c Stands occur in moist meadows that are usually dry by late growing season = **Shorthair sedge-Spike trisetum Herbaceous Vegetation [*Carex exserta*-*Trisetum spicatum* Herbaceous Vegetation] (n=6)**

300A.1Bb.1a.3 Stands characterized by *Carex congdonii*, a medium-sized sedge of scree and boulder fields of the alpine and subalpine zones. Vegetative cover is usually less than 20 percent. Often associated with scattered shrubs of *Sambucus racemosa* (mountain red elderberry). In which cases, stands may or may not be dominated by *C. congdonii* = V.A.5.N.g. ?? **CONGDON'S SEDGE-STREAMBANK ARNICA HERBACEOUS ALLIANCE [CAREX CONGDONII-ARNICA AMPLEXICAULIS HERBACEOUS ALLIANCE](Taylor, 1984)** (see also putative *Sambucus* alliance under shrub alliances) insufficient plot data to define associations in study area.

300A.1Bb.2a.4 *Carex helleri* (Heller's sedge) conspicuous, usually of mid and upper slopes in slightly moist scree or talus appears to have both xeric and mesic associations locally as follows: = **V.A.5.N.g.?? CAREX HELLERI HERBACEOUS ALLIANCE (TAYLOR)**

300A.1Bb.1a.4a *Eriogonum incanum* (vagus or silver buckwheat) and *Raillardella argentea* (silver leaf raillardella) may codominate with *C. helleri* merely present or subdominant; fell fields and dry lower slopes in alpine = **Heller sedge-Silvery buckwheat-Silky Raillardella Herbaceous Vegetation [*Carex helleri*-*Eriogonum incanum*-*Raillardella argentea* Herbaceous Vegetation] renamed Taylor (1984) association**

300A.1Bb.1a.4b *Saxifraga tolmiei* and *Luzula* species are present, often conspicuous. Usually of rocky snowmelt areas in alpine settings = **Heller sedge-Alpine saxifrage-Woodrush Herbaceous Vegetation [*Carex helleri*-*Saxifraga tolmiei*-*Luzula spicata* Herbaceous Vegetation] (n=1)**

300A.1Bb.2a.4c Stands in rocky alpine settings intermediate in moisture requirements between two previous associations = **Heller sedge-Parry rush Herbaceous Vegetation [*Carex helleri*-*Juncus parryi* Herbaceous Vegetation]** (n=1) (Taylor, 1984)

300A.1Bb.1a.5 Small stands dominated by the medium tall *Carex spectabilis* (showy sedge) occur in alpine and subalpine settings around sheltered rocks, snowmelt streams, and below lingering snowbanks = **V.A.5.N.g.8 CAREX SPECTABILIS HERBACEOUS ALLIANCE**

Taylor (1984) mentions two associations from just east of the crest, but samples from our data are few.

300A.1Bb.1a.5a *Senecio triangularis* (arrowhead butterweed) co-occurs with *Carex spectabilis* in relatively productive stringer meadows along streams and seeps wet throughout the growing season = **Showy sedge-Arrowleaf ragwort -Herbaceous Vegetation [*Carex spectabilis*-*Senecio triangularis* Herbaceous Vegetation]** (Taylor, 1984)

300A.1Bb.1a.5b *Carex spectabilis* dominates in a drier usually more rocky setting where moisture diminishes rapidly in later growing season, often as a result of snowbank melt = **Showy sedge-Sibbaldia Herbaceous Vegetation [*Carex spectabilis*-*Sibbaldia procumbens* Herbaceous Vegetation]** (Taylor, 1984) (n=1)

300A.1Bb.1b Taller sedges dominant; stands usually in low-lying productive meadows, streamsides, or lake margins vegetation cover in stands is typically continuous to intermittent.

300A.1Bb.1b.1 *Carex utriculata* (beaked sedge) usually strongly dominates seasonally flooded and saturated edges of ponds, lakes, or slow-moving streams widespread in Zones III, IV, V, VI, and VII = **V.A.5.N.k.42 CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE**

One widespread association characterized by strong dominance of beaked sedge = **Beaked sedge Herbaceous Vegetation [*Carex utriculata* Herbaceous Vegetation]** (Halpern, 1986; Taylor, 1984) (n=11)

300A.1Bb.1b.2 Usually small stands associated with low gradient streams and ponds in Zones III, IV, V, and VII. Often adjacent to willow thickets or low gradient stream and pond sedge stands such as *Carex utriculata* Herbaceous Vegetation = **V.A.5.N.k.43 CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

No association firmly defined (n=2) some data from Potter plots (in 2000 ms)

300A.1Bb.1b.3 The distinctive blue-green stemmed *Carex nebrascensis* (Nebraska sedge) dominates mostly in seasonally flooded meadows in Zones III, IV, VII, and VIII = **V.A.5.N.k.56 CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

One association defined = **Nebraska sedge Herbaceous Vegetation [*Carex nebrascensis* Herbaceous Vegetation] (Beguin & Major, 1975) (n=3)**

300A.1Bb.1b.4 Stands of low-lying wet meadows within Zones IV and V usually surrounded by larger stands of *Calamagrostis breweri* Herbaceous Alliance at slightly less damp conditions. Usually contains substantial cover of the very low creeping subshrub *Kalmia polifolia* (mountain laurel) = **V.A.5.N.k.57 CAREX NIGRICANS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

One association defined by Taylor (1984) = **Blackish sedge/Mountain laurel Herbaceous Vegetation [*Carex nigricans*/*Kalmia polifolia* Herbaceous Vegetation] (Taylor, 1984) < MMU (n=1)**

300A.1Bb.1b.5 Stands usually relatively narrow fringes associated with low gradient snowmelt streams and small tarn edges in Zones IV, V, and VI. *Carex scopulorum* (Rocky Mountain sedge) is usually dominant but may only be conspicuous and codominant with *Calamagrostis breweri* in some stands = **V.A.5.N.k.59 CAREX SCOPULORUM SEASONALLY FLOODED HERBACEOUS ALLIANCE**

300A.1Bb.1b.5a May have high *Calamagrostis breweri*, typically does not have significant cover of either *Pedicularis groenlandica* or *Eleocharis pauciflora* = **Rocky Mountain sedge Herbaceous Vegetation [*Carex scopulorum* Herbaceous Vegetation] (n=6)**

300A.1Bb.1b.5b *Pedicularis groenlandica* usually conspicuous in stands = **Rocky Mountain sedge-Elephant ears Herbaceous Vegetation [*Carex scopulorum*-*Pedicularis groenlandica* Herbaceous Vegetation] (Taylor, 1984) (n=1)**

300A.1Bb.1b.5c *Eleocharis pauciflora* (few-flowered spikerush) conspicuous in stand = **Rocky Mountain sedge-Few-flowered spikerush Herbaceous Vegetation**

[*Carex scopularum*-*Eleocharis pauciflora* Herbaceous Vegetation] (Taylor, 1984) (n=7)

300A.1Bb.2 The diminutive spikerush, *Eleocharis pauciflora*, is conspicuous or dominant with no other characteristic species of graminoids (sedges, rushes, or grasses) present. Usually of seasonally flooded muck or organic muds in wet meadows and drying pond and tarn edges = **V.A.5.N.k.62 ELEOCHARIS QUINQUEFLORA (aka *E. pauciflora*) SEASONALLY FLOODED HERBACEOUS ALLIANCE**

Only one association defined for the area = ***Eleocharis pauciflora* Herbaceous Vegetation (Benedict, 1983)**

300A.1Bb.3 A rush (*Juncus* sp.) dominant or conspicuous, may have grasses, sedges, or subshrubs present.

300A.1Bb.3a The short tufted *Juncus parryi* conspicuous, usually of mesic to xeric rock outcrops and slabs or granitic benches with well drained soils of Zones III, IV, V, and VI. May have other species such as *Phyllodoce breweri* (Sierra mountain heather), *Eriogonum incanum* (vagus buckwheat), *Streptanthus tortuosus* (jewelflower), or *Carex spectabilis* (showy sedge) conspicuous or even dominant = **V.A.5.N.h.14 JUNCUS PARRYI HERBACEOUS ALLIANCE**

300A.1Bb.3a.1 *Carex spectabilis* and *Sibbaldia procumbens* present in the stand, usually in moist rocky slopes in alpine or subalpine = **Parry rush-Showy sedge-Sibbaldia Herbaceous Vegetation [*Juncus parryi*-*Carex spectabilis*-*Sibbaldia procumbens* Herbaceous Vegetation] (Taylor, 1984) (n=2)**

300A.1Bb.3a.2 *Juncus parryi* common along with *Eriogonum incanum* (vagus or silvery buckwheat) in relatively dry well drained stands in alpine and subalpine = **Parry rush-Silvery buckwheat Herbaceous Vegetation [*Juncus parryi*-*Eriogonum incanum* Herbaceous Vegetation] (Taylor, 1984)**

300A.1C Vegetation characterized by tall graminoids usually greater than 1.5 meters in height; two alliances currently identified in mapping area.

300A.1Ca. Uncommon in ditches and marshes of Zones I and II = **V.A.5.N.I.9 TYPHA (ANGUSTIFOLIA, LATIFOLIA)-(SCIRPUS ssp.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE**

Represented locally by one association = **Cattail Herbaceous Vegetation [*Typha* spp. Herbaceous Vegetation] (n=3)**

300A.1 Cb Locally occurs in ponds near Tuolumne Meadows in Zone IV = **V.A.5.N.I.16 SCIRPUS ACUTUS - (SCIRPUS TABERNAEMONTANI) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE** no associations or samples locally

300A.2 Vegetation dominated by broad-leaved perennial forbs or nongrasslike herbs. This section is divided into three groups: tall perennial forbs, short perennial forbs, and hydromorphic perennial forbs.

Most stands are small and confined to micro sites defined by moisture tolerances of the characteristic species.

300A.2A Vegetation dominated by tall perennial forbs (generally > 0.5 meter tall) of moist to wet settings usually in Zones II, III, IV, and V.

300A.2Aa Vegetation dominated by the coarse broad-leaved liliaceous *Veratrum californicum* (corn lily). Stands may or may not have a significant mixture of the tall dicot form *Senecio triangularis* (arrowleaf butterweed) = **V.B.2.N.d.8 VERATRUM CALIFORNICUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE**

Currently only one association defined with *Senecio triangularis* present and may be codominant = **California corn lily-Arrowleaf butterweed Herbaceous Vegetation** [*Veratrum californicum*-*Senecio triangularis* Herbaceous Vegetation] (Taylor, 1984)

300A.2Ab. The moderately tall leafy *Solidago canadensis* (Canada goldenrod) conspicuous and usually dominant with a mixture of other moist meadow species = **V.B.2.N.a.?? SOLIDAGO CANADENSIS-ACHILLEA MILLEFOLIUM ALLIANCE (UNDESCRIBED) (n=4)**

300A.2Ac *Lupinus latifolius* (leafy lupine) the dominant species, occurs in moist to wet springsides, seeps, and meadows, usually partly shaded = **V.B.2.N.d ?? LUPINUS LATIFOLIUS HERBACEOUS ALLIANCE (new alliance and single association) (n=4)**

300A.2Ad Vegetation of wet montane to alpine meadows, dominated by *Polygonum bistortoides* (American bistort). Note: This alliance is provisional in the area, a few stands are dominated by *P. bistortoides*, but upon further sampling and analysis these may be better placed in another alliance such as *Deschampsia caespitosa* alliance. Common associated species include *Trifolium longipes*, *Juncus macrophyllus*, *Penstemon parvifolius* = **V.B.2.N.d.?? BISTORT (POLYGONUM BISTORTOIDES) UNDESCR ALLIANCE (n=4) may include the Longstalk clover (*Trifolium longipes*) association as defined by Ratliff (1982, 1985)**

300A.2Ae *Senecio triangularis* strongly dominant, in montane to alpine wet meadows and streamsides. No plots clearly fall into this alliance, it appears that our data containing significant *S. triangularis* cover is best currently put into the *Veratrum californicum*, *Lupinus latifolius*, or other alliances at this time. However, this is included in key for completeness and breadth of interpretability = **V.B.2.N.d.12 SENEIO TRIANGULARIS TEMPORARILY FLOODED HERBACEOUS ALLIANCE**

300A.2 B Vegetation dominated by short perennial forbs (generally greater than 0.50 meter tall). This group includes short, open alpine and subalpine upland types as well as wetland types of freshets and other wet areas. Most stands are small and patchy.

300A.2Ba Open stands in the xeric upland alpine zones (V and VI) with scattered small tufts of grass in association with other perennial herbs.

300A.2Ba.1 *Elymus elymoides* (squirreltail) and/or *Festuca minutiflora* in association with *Phlox covillei* and other low perennial, matted herbs = **V.B.2.N.b?? PHLOX COVILLEI-ELYMUS ELYMOIDES ALLIANCE (Taylor, 1984)**

300A.2Ba.1a *Festuca minutiflora* and *Penstemon davidsonii* in association with *Phlox covillei* and *Elymus elymoides*. Xeric rocky fell fields = **Coville phlox-Squirreltail-Small-flowered fescue-Davidson penstemon Herbaceous Vegetation [Phlox covillei-Elymus elymoides-Festuca minutiflora-Penstemon davidsonii Herbaceous Vegetation] (was Festuca minutiflora-Penstemon davidsonii association [Taylor, 1984]) (n=1)**

300A.2Ba.1b *Phlox covillei* and *Elymus elymoides* in association with the matted umbeliferous *Podistera*, but without *Erigeron pygmaeus*, fewer boulders and large rocks and more uniform xeric (well drained) substrate than former association = **Coville phlox-Squirreltail-Alpine Podistera Herbaceous Vegetation [Phlox covillei-Elymus elymoides-Podistera nevadensis Herbaceous Vegetation] (Taylor, 1984) (n=4)**

300A.2Ba.1c *Podistera nevadensis* and *Elymus elymoides* in association with *Erigeron pygmaeus*. Usually xeric ridgelines and open upper slopes in alpine zone = **Coville phlox-Squirreltail-Alpine podistera-Pygmy daisy Herbaceous Vegetation [Phlox covillei-Podistera nevadensis-Elymus elymoides-Erigeron pygmaeus Herbaceous Vegetation] (Taylor, 1984) (n=8)**

300A.2Ba.2 Scattered plants of *Arenaria (Minuartia) nuttallii* often in association with *Achnatherum occidentale* (western needlegrass) and the subshrub *Ericameria discoidea* (alpine goldenbush) = **V.B.2.N.b?? Nuttall sandwort-Alpine goldenbush (alliance) (1) (Taylor, 1984) (n=1) Note: Field crews identified the Arenaria in this alliance as A. kingii ssp. compacta and not A. nuttallii.**

300A.2Ba.3 Stands have scattered plants of *Penstemon newberryi* (mountain pride penstemon) in association with the annual *Streptanthus tortuosus* (mountain jewelflower) and other small herbs. May also have small shrubs such as *Spiraea densiflora* (mountain spiraea) or scattered emergent *Pinus contorta* var. *murrayana* (Sierra lodgepole pine) in either tree or krummholz form. Widespread on granitic and metamorphic outcrops throughout Zones III to VI = **V.B.2.N.b?? PENSTEMON NEWBERRYI-STREPTANTHUS TORTUOSUS HERBACEOUS ALLIANCE (TAYLOR, 1984) [stands with significant Pinus contorta are in P. contorta alliance]**

300A.2Ba.3a *Spiraea splendens* [*S. densiflora*, Hickman 1993] is the predominant shrub or subshrub in the stand = **Sierra spiraea/Mountain pride penstemon-Mountain jewelflower Herbaceous Vegetation [Spiraea splendens/Penstemon newberryi-Streptanthus tortuosus Herbaceous Vegetation] (Taylor, 1984) (n=7)**

300A.2Ba.3b Stands without shrubs and typically with variable cover of *Selaginella watsonii* = **Mountain pride penstemon-Mountain jewelflower-Watson's clubmoss Herbaceous Vegetation [Penstemon newberryi-Streptanthus tortuosus-Selaginella watsonii Herbaceous Vegetation] (n=5) (Taylor, 1984)**

300A.2Ba.3c Stands with *Sedum obtusatum* ssp. *boreale* (sierra stonecrop) present, may have *Muhlenbergia montana* = **Mountain pride penstemon-**

Mountain jewelflower-Sierra stonecrop-Mountain muhly Herbaceous Vegetation [*Penstemon newberryi*-*Streptanthus tortuosus*-*Sedum obtusatum* ssp. *boreale*-*Muhlenbergia montana* Herbaceous Vegetation] (Taylor, 1984) (n=1)

300A.2Ba.3d *Pinus contorta* var. *murrayana* conspicuous emergent tree or krummholz shrub over scattered herbaceous understory with mountain pride penstemon (*Penstemon newberryi* ssp. *berryi*); usually rocky outcrops with poor soil development = **Lodgepole pine/Mountain pride penstemon Forest** [*Pinus contorta* var. *murrayana*/*Penstemon newberryi* Forest] (n=5) [Of the *Pinus contorta* alliance see 100A.2Ba.1c.4]

300A.2Ba.4 Stands with the showy flowered composite herb *Hulsea algida* conspicuous. Usually rocky scree areas on mid and upper slopes in alpine Zones V and VI = **V.B.2.N.b.?? ALPINE HULSEA ALLIANCE** (Taylor, 1984)

Local stands are usually associated with scattered subshrubs of *Ericameria discoidea* (alpine goldenbush) and with the herb *Phacelia hastata* ssp. *compacta* = **Alpine hulsea-Alpine goldenbush-Alpine phacelia Herbaceous Vegetation** [*Hulsea algida*-*Ericameria discoidea*-*Phacelia hastata* ssp. *compacta* Herbaceous Vegetation] (Taylor, 1984) (n=1)

300A.2Ba.5 Low density stands of rock jumbles and talus, usually cold sheltered locations in alpine zone. The characteristic species locally are *Oxyria digyna* (mountain sorrel) and *Draba lemmonii* (Lemmon's whitlow grass) = **V.B.2.N.b.?? OXYRIA DIGYNA ALLIANCE** (TAYLOR, 1984), *Draba lemmonii*-*Oxyria digyna* association (Taylor, 1984) (n=1)

300A.2Ba.6 Stands dominated by low scattered herbs including *Sedum rosea* (rose root stonecrop) and *Selaginella watsonii* (Watson's spikemoss). Usually of moist snowmelt areas Taylor (1984) includes these stands in what he calls the NESTED SAXIFRAGE-SUKSDORF MONKEY FLOWER (*SAXIFRAGA NIDIFICA*-*MIMULUS RUBELLUS*) (ALLIANCE) (4) (TAYLOR, 1984). However, the species *S. nidifica* and *M. rubellus* do not seem to be good indicators throughout the mapping area. Thus we are calling this **Alpine sedum-Watson spikemoss Herbaceous Vegetation** [*Sedum rosea*-*Selaginella watsonii* Herbaceous Vegetation] (Taylor, 1984) (n=1) within an unknown alliance at this time.

300A.2Bb Moist to wet environments of alpine meadows, streamsides, and similar settings where plant density is relatively high. Most of these vegetation types are currently poorly defined and based on few samples and tentative rules of dominance.

300A.2Bb.1 Stands of moist meadows that are strongly dominated by alpine aster, *Aster alpigenus* ssp. *andersonii* (aka *Oreostemma alpigenum* var. *alpigenum*). These stands are related to the *Carex nigricans* Alliance (see 300A.1Bb.1b.4) and perhaps the *Calamagrostis breweri* Alliance (see 300A.1Ba.1a). Currently these stands strongly dominated by alpine aster with low or no cover of other similar alliance; diagnostic species are tentatively considered **V.B.2.N.d.?? ALPINE ASTER** (*Aster alpigenus* ssp. *andersonii* ALLIANCE??) (n=1)

300A.2Bb.2 Stands strongly dominated by *Arnica mollis* (hairy arnica). Moist areas adjacent to alpine and subalpine streams and meadows = **V.B.2.N.d?? ARNICA MOLLIS (Hairy arnica ALLIANCE?? (n=1)** no associations defined

300A.2Bb.3 Small stands in wet mossy rises in wet meadows dominated by *Mimulus primuloides* (primrose monkey flower) may be a part of the nationally recognized **V.B.2.N.d.9 MIMULUS PRIMULOIDES TEMPORARILY FLOODED HERBACEOUS ALLIANCE**. It is likely that the plot sizes used in this study would be too large to define this alliance.

300A.2Bb.4 Stands strongly dominated by *Penstemon heterodoxus* or *P. rydbergii* (Heretic or Meadow penstemon). Too few samples to determine proper alliance for these, related to *Carex exserta* and *Calamagrostis breweri* alliances tentatively placed in **V.B.2.N.b?? MEADOW PENSTEMON (P. RYDBERGII, P. OREOCHARIS) STANDS (UNDESCR) (n=1)**

300A.2C Vegetation dominated by hydromorphic rooted vegetation. Nonemergent graminoids and forbs structurally supported by water and rooted in substrate (e.g., pond weeds and water lilies).

300A.2Ca Predominant species are short, often submerged in shallow water of ponds and lakes for much of the growing season = **V.C.2.N.a.6 ISOETES (BOLANDERI, ECHINOSPORA, OCCIDENTALIS, NUTTALLII) PERMANENTLY FLOODED HERBACEOUS ALLIANCE**

300A.2Ca.1 The aquatic grass with partially floating blades *Torreyochloa erecta* (spiked false mannagrass) forms an emergent layer or may dominate over a short layer of *Isoetes occidentalis* (western quill wort) = **Western quill wort/spiked false mannagrass Herbaceous Vegetation [*Isoetes occidentalis*/*Torreyochloa erecta* Herbaceous Vegetation] (Taylor, 1984) (n=1)**

300A.2Ca.2 *Isoetes occidentalis* is the sole dominant species in the stands = **Western quill wort Herbaceous Vegetation [*Isoetes occidentalis* Herbaceous Vegetation] (Taylor, 1984) (n=2)**

300A.2Cb Predominant species are elongated floating or submerged-leaved hydrophytes

300A.2Cb.1 *Nuphar lutea* (yellow pond lily) dominant or conspicuous = **V.C.2.N.a.9 NUPHAR LUTEA PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE**, no plots, but likely occurs in the study area.

300A.2Cb.2 Pond weeds (*Potamogeton* sp. are dominant = **V.C.2.N.a.23 POTAMOGETON (DIVERSIFOLIUS, FILIFORMIS) PERMANENTLY FLOODED HERBACEOUS ALLIANCE**, no plots, but is known from some shallow lakes in the study area.

300A.2Cb.3 *Sparganium angustifolium* (narrow-leaf bur-reed) the dominant species, usually of shallow lakes and ponds, common throughout Zones III, IV, V, VI, and VII = **V.C.2.N.a.20 SPARGANIUM ANGUSTIFOLIUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE**

Locally represented by *Sparganium angustifolium* Herbaceous Vegetation (n=5)

300A.3 Vegetation dominated by annual grasses or forbs**300A.3A Annual vegetation characterized by native or nonnative annual forbs**

300A.3Aa *Centaurea solstitialis* dominates stands in Zone I usually only conspicuous after the early spring annuals are dead (June–July). The species is an invasive exotic that is being actively managed in the environs but does form a distinctive cluster in the analysis. Currently considered an alliance with limited plot data. Otherwise similar to the following native annual alliance = **V.D.2.N.c? YELLOW STAR THISTLE ALLIANCE?? (n=1)**

300A.3Ab Stands dominated by early spring flowering annuals including *Lotus* and *Trifolium* species. Later in the growing season other annuals such as *Lessingia* predominate = **V.D.2.N.c? CALIFORNIA ANNUAL HERBLAND ALLIANCE? (n=3)**

No plots were sampled, but stands were observed with high relative cover of native annual forbs in zone 1. Sampling is needed to determine if there is a local expression of this alliance. Taxa expected include *Trifolium* sp., *Lotus* sp., *Lessingia* sp. and native annual and perennial grasses.

300A.3B Annual vegetation dominated by nonnative annual grasses

300A.3Ba Vegetation dominated by annual nonnative grasses of the genus *Bromus*. Also includes native annual *Trifolium* species = **V.D.2.N.d.1 BROMUS (DIANDRUS, HORDEACEUS, MADRITENSIS) HERBACEOUS ALLIANCE (California annual grassland Alliance)**

Represented locally by one variable association Soft chess-Ripgut brome-Small-headed clover-Wild carrot Herbaceous Vegetation [*Bromus hordeaceus*-*Bromus diandrus*-(*B. madritensis*)-*Trifolium microcephalum*-*Daucus pusillus* Herbaceous Vegetation] (n=3)

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IV. DESCRIPTIONS OF VEGETATION ASSOCIATIONS WITHIN YOSEMITE VEGETATION MAPPING AND CLASSIFICATION PROJECT BOUNDARIES

This section of the report is broken into five subsections. Each subsection treats the vegetation within one or two of the eight ecological zones identified for the study area. Placement of vegetation types into zones is usually straightforward. However, some types clearly span more than one zone. In such cases, we have elected to assign a particular type of vegetation to its modal zone, where it is most characteristically found in greatest frequency. The authors of the descriptions are Sau San, Michael Schindel, Diana Hickson, and Todd Keeler-Wolf. All descriptions were edited by Todd Keeler-Wolf. The principal author of ecological Zones I and II was Sau San; Zones III and IV were authored by Keeler-Wolf, Hickson, and Schindel; Zones V and VI were largely written by Schindel; and Zones VII and VIII were written primarily by Schindel and Keeler-Wolf. Within each section the descriptions are broken into herbaceous-, shrub-, and tree-dominated vegetation. The location of each may be found in the table of contents.

Included herein are 185 descriptions. Several that were slated to be written earlier in the project have proven to be phases of other associations or had insufficient data to support their descriptions. These descriptions should in most cases be considered preliminary. Yosemite has an extensive array of vegetation types, the relationships among which are becoming understood for the first time. More than 100 new vegetation types were defined as a result of the data collected and analyzed for the production of this report. Although this project has made great strides in clarifying vegetation relationships in the central Sierra Nevada, many of the nuances are yet to be understood. There are many similar types that will require further sampling. Further analysis of the vegetation plot data from Sequoia and Kings Canyon national parks coming up in the next year will be compared with the Yosemite data, and we expect there will be some clarification of many of these closely related types. The notion of basing association descriptions on as little as three plots is usually relatively untenable. Although field observation of additional stands was usually available, there is a strong need to collect further plot data on many of the vegetation types defined by fewer than 10 plots.

Each description is written in a standardized format used by NatureServe to induct newly defined vegetation types into the National Vegetation Classification System (see below for descriptive template).

INFORMATION IN VEGETATION DESCRIPTIONS

GLOBAL NAME

Association name based on Latin names of dominant or characteristic plant species. The association (or plant association) is the finest level of the classification system. It is the level at which community inventory and conservation action are aimed.

COMMON NAME

Association common name; same as the GLOBAL NAME but with common names instead of scientific names for the species.

SYNONYM

A unique name by which the community may be more easily recognized or described.

PHYSIOGNOMIC CLASS

The second level of the National Vegetation Classification System that is a vegetation structural classification adapted from UNESCO in 1973 and Driscoll et al., 1984. This level is based on the structure of the vegetation. This is determined by the height and relative percentage of cover of the dominant life-forms: tree, shrub, dwarf-shrub, herbaceous, and nonvascular.

PHYSIOGNOMIC SUBCLASS

The third level of the National Vegetation Classification System. This level is determined by the predominant leaf phenology of classes defined by a tree, shrub, or dwarf-shrub stratum; the persistence and growth form of herbaceous and nonvascular vegetation; and particle size of the substrate for sparse vegetation (e.g., consolidated rocks, gravel/cobble).

PHYSIOGNOMIC GROUP

The fourth level of the National Vegetation Classification System. The group generally represents a grouping of vegetation units based on leaf characters such as broadleaf, needleleaf, microphyllous, and xeromorphic. These units are identified and named with broadly defined macroclimatic types to provide a structural–geographic orientation, but the ecological climate terms do not define the groups *per se*.

PHYSIOGNOMIC SUBGROUP

The fifth level of the National Vegetation Classification System represents a distinction between natural vegetation including natural, seminatural and some modified vegetation, and cultural vegetation (planted/cultivated).

FORMATION

The sixth level of the National Vegetation Classification System represents a grouping of community types that share a definite physiognomy or structure and broadly defined environmental factors such as elevation and hydrologic regime.

ALLIANCE: Level of the National Vegetation Classification System reflecting a physiognomically uniform group of plant associations sharing one or more diagnostic species (dominant, differential, indicator, or character) that (generally) are found in the uppermost stratum of the vegetation.

CLASSIFICATION CONFIDENCE LEVEL: The degree of confidence associated with the classification of the Element (association or alliance). This confidence is based on the quality and type of data used in the analysis as well as the extent to which the entire (or potential) range of the Element was considered.

1 STRONG

Classification based on recent field data. Information is based on Element Occurrences or other data based on occurrences that can be relocated. Classification considers information collected across the entire range or potential range of the Element. Classification may be based on quantitative or qualitative data.

2 MODERATE

Classification is based on data that is of questionable quality, limited numbers of sample points, or data from a limited range.

3 WEAK

Classification is based on secondary or anecdotal information or a new type for which data have only been collected at a small number of sites.

USFWS WETLAND SYSTEM:

USFWS Wetland Classification System, if applicable. (Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. United States Fish and Wildlife Service. Washington, DC).

RANGE:

Globally

Description of the association's present range including states of occurrence.

Yosemite National Park

Description of where the community is found in the Park (if known).

ENVIRONMENTAL DESCRIPTION

Globally

Most important environmental determinants of the biological composition or structure of this association and/or its subtypes.

Yosemite National Park

Important environmental determinants of the biological composition or structure of this association within the Park (if known).

MOST ABUNDANT SPECIES

Globally

Stratum Species

Most abundant species by stratum.

Yosemite National Park

Stratum Species

Most abundant species by stratum.

CHARACTERISTIC SPECIES

Globally

Stratum Species

Latin names of plant species not necessarily most abundant but that are characteristic or diagnostic of the association when taken singly or in combination with other species.

Yosemite National Park

Stratum Species

Characteristic species for the association, if different from global species.

VEGETATION DESCRIPTION

Globally

Additional comments on vegetation attributes of the association including species richness, diversity, physiognomic structure, spatial distribution of vegetation, strata height, dominant life-forms, coverage of unvegetated substrate, and additional compositional comments.

Yosemite National Park

Vegetation description for the association, if different from global concept.

OTHER NOTEWORTHY SPECIES

High ranked species, animals, endemics, disjuncts, or exotics that are found within occurrences of this association.

CONSERVATION RANK

Global Element Rank that characterizes the relative rarity or endangerment of the association worldwide.

RANK JUSTIFICATION

Reason for assigning the Global Element Rank, such as number of occurrences, number of hectares, total area reduction from original, threats, degradation, and so forth.

DATABASE CODE

Element Code from the National Community Database.

COMMENTS

Globally

Any other comments about this association not covered in the fields above such as landscape relationships, inclusion communities, and so forth.

Yosemite National Park

Any other comments about this association specific to the Park including notes about possible problems in photointerpretation.

REFERENCES

Sources of information used to define or describe the association.

**ECOLOGICAL ZONES I AND II: CHAPARRAL, OAK WOODLANDS, LOW
ELEVATION CONIFEROUS AND BROAD-LEAVED SCLEROPHYLL
FORESTS AND WOODLANDS OF THE WEST SLOPE**

HERBACEOUS ASSOCIATIONS OF ZONES I AND II

***Elymus glaucus* - *Carex pellita* (*Carex lanuginosa*, Hickman 1993) Herbaceous Vegetation [Provisional]**

COMMON NAME	Blue Wildrye - Woolly Sedge Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Medium tall bunch temperate or subpolar grassland

ALLIANCE *Elymus glaucus* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland, Palustrine (Seasonally flooded)

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely to occur in moist meadow edges elsewhere in the Sierra Nevada.

Yosemite and environs

Stands of *Elymus glaucus* - *Carex pellita* Herbaceous Vegetation were sampled within the El Capitan and Half Dome 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Elymus glaucus* - *Carex pellita* Herbaceous Vegetation are found at low elevations (3,900–4,000 feet) at the bottoms of flat mountain valleys (most commonly in Yosemite Valley, locally). Soils are poorly drained to very poorly drained, and textures range from sandy loam to peat from granitic parent material. Litter tends to be high, ranging from 40–99 percent cover. Water can have 0–50 percent cover. Litter consists of 40–99 percent cover. Disturbance is

common and is usually caused by low impact levels from invasion of exotic species and sometimes by low to medium impact levels from road or trail construction.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Elymus glaucus*, *Carex pellita*, *Poa pratensis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Elymus glaucus*, *Carex pellita*, *Poa pratensis*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Elymus glaucus* - *Carex pellita* Herbaceous Vegetation consist of 90–100 percent cover at 0.5–1 meter tall. This association forms a continuous layer dominated by *Elymus glaucus*, *Carex pellita* (= *Carex lanuginosa*), and *Poa pratensis*. Often found in this association are *Artemisia douglasiana*, *Agrostis stolonifera*, *Carex feta*, and *Equisetum arvense*. *Cirsium vulgare*, *Solidago californica*, *Lotus unifoliolatus*, *Brodiaea elegans*, and *Juncus balticus* may be found contributing to minor cover. Occasionally, *Asclepias fascicularis*, *Iris missouriensis*, *Juncus mexicanus*, and *Rumex acetosella* may be common.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2?

RANK JUSTIFICATION Likely to be a type that is heavily influenced by grazing and invasion of exotics. It is also likely to be a type of very limited extent.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

There is high overlap in the environmental settings of *Elymus glaucus*-*Carex pelita* (*lanuginosa*) Herbaceous Association and the following *Elymus glaucus*-*Carex feta* association including elevation (same base elevation but *E. glaucus*-*C. feta* ranging higher based on 3 vs. 4 plots), soil textures (sandy loam to peat vs. sand to peat), parent material, litter cover, and source of disturbance. *Elymus glaucus* and *Poa pratensis* are shared between the two types for most abundant species and

characteristic species. *C. feta* occurred in two of the four *E. glaucus*-*C. lanuginosa* plots. At least eight species are shared among the plots in the two types. With further data lumping of these two associations may be supportable. We have chosen to keep them separate here because one (*E. glaucus*-*C. feta*) appears to be somewhat less mesic, regularly occurring in upland settings, while the other is more consistently mesic to vernal saturated. Both associations are considered tentative and should be supplemented with further plot data and analysis.

Plots used to describe association (n=4)

USGS-NPS Veg Data: 98K34, 98M32, 98K28, 98K29

***Elymus glaucus* - *Carex feta* Herbaceous Vegetation [Provisional]**

COMMON NAME	Blue Wildrye - Green-Sheath Sedge Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Medium tall bunch temperate or subpolar grassland

ALLIANCE *Elymus glaucus* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland, Palustrine (Seasonally flooded)

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Elymus glaucus* - *Carex feta* Herbaceous Vegetation are sampled in the mapping area of Yosemite and environs within the Half Dome, Mt. Dana, and Wawona 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Elymus glaucus* - *Carex feta* Herbaceous Vegetation are found at low to midelevations (3,900–7,500 feet) on the bottoms of mountain valleys and basin floors. Soils are very poorly drained to moderately well drained with textures ranging from sand to peat and of igneous and granitic parent materials. Litter ranges from 30–99 percent cover but tends to be high. Disturbance tends to be from invasion of exotics, road or trail construction, and development with low to medium impact levels. Some sites may be in seasonally flooded, palustrine areas.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Elymus glaucus*, *Poa pratensis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Elymus glaucus*, *Poa pratensis*, *Carex feta*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Elymus glaucus* - *Carex feta* Herbaceous Vegetation consist of 90 percent cover at 0–0.5 meter tall and 100 percent cover at 0.5–1 meter tall. This association forms a continuous herbaceous layer dominated by *Elymus glaucus*, *Carex feta*, and *Poa pratensis*. Often found in this association is *Lotus unifoliolatus* var. *unifoliolatus*, *Rumex acetosella*, *Artemisia douglasiana*, and *Potentilla* sp. Occasionally, *Carex athrostachya*, *Juncus xiphioides*, *Penstemon rydbergii* var. *oreocharis*, *Achillea millefolium*, *Juncus* sp., and *Solidago californica* are common. Other species that may be found contributing to minor cover may include *Agrostis gigantea*, *Bromus hordeaceus*, *Bromus japonicus*, *Bromus tectorum*, *Carex* sp., *Deschampsia danthonioides*, *Equisetum laevigatum*, *Euthamia occidentalis*, *Lessingia leptoclada*, *Linanthus ciliatus*, *Stachys albens*, *Madia elegans* ssp. *elegans*, *Muhlenbergia richardsonis*, and *Poa compressa*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2?

RANK JUSTIFICATION Likely to be a type that is heavily influenced by grazing and invasion of exotics. It is also likely to be a type of very limited extent.

DATABASE CODE To be determined

COMMENTS

Globally

Similar stands have been observed in the Sierra Nevada as far north as Grass Valley (Keeler–Wolf pers obs 2002).

Yosemite and environs

This association appears to be present on both the east and west side of the Sierra Crest, associated with moist meadows in either Zone II or Zone VIII. See also comment on similarity in *E. glaucus*-*C. pelita* association.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 98K33, 98K36, 98M48

***Bromus hordeaceus* – *Bromus diandrus* – (*B. madritensis*) - *Trifolium microcephalum* – *Daucus pusillus* Herbaceous Vegetation [Provisional]**

COMMON NAME	Soft chess – Ripgut brome – Small-headed clover – Wild Carrot Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Annual graminoid or forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar annual grasslands or forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short temperate annual grassland
ALLIANCE	<i>Bromus</i> (<i>diandrus</i> , <i>hordeaceus</i> , <i>madritensis</i>) Herbaceous Alliance (California Annual Grassland Alliance)

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Bromus hordeaceus* – *Bromus diandrus* – (*Bromus madritensis*) - *Trifolium microcephalum* – *Daucus pusillus* Herbaceous Vegetation were sampled within the El Portal 7.5 minute topographic quadrangle.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Bromus hordeaceus* – *Bromus diandrus* – (*Bromus madritensis*) - *Trifolium microcephalum* – *Daucus pusillus* Herbaceous Vegetation are found at low elevations (1,700–2,000 feet) on the midslope of southeast- to west-facing, somewhat steep to steep (17–29 degrees), concave, undulating, and linear slopes. Soils are somewhat poorly drained to well drained with textures ranging from loam to clay loam from metamorphic, schist, and gneiss parent materials. Litter ranges from 60–96 percent cover. Disturbance from invasion of exotics is common, and impact levels are low to high.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Trifolium microcephalum*, *Bromus hordeaceus*, *Galium parisiense*, *Avena fatua*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Trifolium microcephalum*, *Bromus hordeaceus*, *Daucus pusillus*, *Galium parisiense*, *Hypochaeris glabra*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Bromus hordeaceus* – *Bromus diandrus* – (*Bromus madritensis*) - *Trifolium microcephalum* - *Daucus pusillus* - Herbaceous Vegetation consist of 0–60 percent cover at 0–0.5 meter tall, 5–90 percent cover at 0.5–1 meter tall, 5–20 percent cover at 1–2 meters tall, and 5 percent cover at 2–5 meters tall. This association often forms a continuous, sometimes open, herbaceous layer dominated by *Trifolium microcephalum*, *Bromus hordeaceus*, *Daucus pusillus*, and *Galium parisiense*. *Avena fatua* and *Hypochaeris glabra* are also present. *Centaurea solstitialis* and *Lotus unifoliolatus* var. *unifoliolatus* can be common at many sites. *Lessingia leptoclada*, *Bromus arenarius*, *Trifolium ciliolatum*, *Lupinus bicolor*, *Lactuca serriola*, and *Thysanocarpus curvipes* are often found in this association. A variety of other species may be found contributing to minor cover and often include *Avena barbata*, *Bromus diandrus*, *Calandrinia ciliata*, *Castilleja densiflora*, *Croton setigerus*, *Silene gallica*, *Stephanomeria virgata*, *Torilis arvensis*, and *Vulpia myuros*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2?

RANK JUSTIFICATION It is unusual to find native annual-dominated stands in much of cismontane California and these stands tend to be small and localized.

DATABASE CODE To be determined

COMMENTS

Globally

There is mounting evidence for an herbaceous annual alliance defined by native species such as *Trifolium microcephalum* and other *Trifolium* species that ranges throughout much of cismontane California. Many of the species are widespread and could have been the pre-European cover of much of the nonwooded portions of cismontane California prior to the establishment and widespread dominance of non-native annual grasses and herbs. Isolated pockets of these native annual stands should be inventoried and sampled to develop a better synoptic idea of the native annual vegetation of California.

Yosemite and environs

This is likely to have been close to the modal expression of many upland herbaceous stands in the Sierra Nevada foothills and perhaps elsewhere in cismontane California, prior to the general dominance of openings by non-native annual grasses. The sampling of additional stands of this association and alliance will provide a better picture of restoration potential for the huge areas of relatively highly disturbed and invaded annual vegetation of much of the Sierra foothill region.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99S17, 98K2, 98K5

**TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED
HERBACEOUS ALLIANCE [Provisional]**

(Note: This alliance is represented locally by only three variable samples and is thus treated at the alliance level in the description)

COMMON NAME

Bullrush- Cattail Grassland Alliance

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial Grassland

PHYSIOGNOMIC GROUP

Temperate of Subpolar Grassland

PHYSIOGNOMIC SUB GROUP

Natural/ Semi- Natural

FORMATION

Semi permanently flooded temperate or subpolar grassland

ALLIANCE

***Typha (angustifolia, latifolia) - (Scirpus spp.) Semipermanently
Flooded Herbaceous Alliance***

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Wetland, Palustrine, Emergent Wetland

RANGE

Globally

This alliance is widespread throughout California, the Western United States, and much of North America. Similar stands are found throughout California, although association level information affording more detailed comparison with the local Yosemite stands is lacking.

Yosemite and environs

Three stands of this alliance are sampled in the Yosemite, El Capitan and Half Dome 7.5 minute topographic quadrangles. Most stands are small, less than 1 acre.

ENVIRONMENTAL DESCRIPTION

Globally

This alliance is found most commonly along lake or pond margins, slow-moving ditches, in shallow basins, adjacent to stream or river channels in wet mud, oxbows, and occasionally in river backwaters. Elevations range from near sea level to around 2000 m. Sites where this alliance occurs are typically semi-permanently flooded, inundated with 30 to 100 cm of water throughout the year. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. *Typha angustifolia* can grow in deeper water compared to *Typha latifolia*, although both species reach maximum growth at a water depth of 50 cm.. Soils are characterized by accumulations of organic matter over deposits of fine silt and clay or loams, sandy loams, or coarse sand. *Typha* often occurs in pure stands, and can colonize areas recently exposed by either natural or human causes.

Yosemite and environs

This association is found on flat, or gently sloping basin wetlands. Soil textures are mucky and poorly to very poorly drained over granitic substrate. Water typically is at the surface throughout the growing season. Water chemistry is fresh. Sites are from 3800 to 4000 ft elevation. Litter and duff cover is high ranging from 55-80 percent. Standing water covered 10-20 percent of the plots.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Typha latifolia*, *T. dominicensis*, and *T. angustifolia* are common along with *Scirpus californicus* and a variety of other wetland herbaceous species.

Yosemite and environs

Herbaceous *Typha latifolia*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Typha latifolia*, *T. angustifolia*

Yosemite and environs

Herbaceous *Typha latifolia*

VEGETATION DESCRIPTION

Globally

This alliance is found at low to moderate elevations in virtually every state in the United States and probably most Canadian provinces. It contains stands dominated by *Typha angustifolia* and/or *T. latifolia*, either alone or in combination with other tall emergent marsh species. Associated species vary widely; in the central and western US, they include many sedges such as *Carex aquatilis*, *C. rostrata*, *C. lanuginosa*, and bulrushes such as *Scirpus americanus*, *S. acutus*, *S. tabernaemontanii*, and *S. heterochaetus*. Other graminoids can include *Juncus* spp., *Eleocharis* spp., or *Glyceria* spp. In the central and eastern parts of its range, broad-leaved herbs such as *Thelypteris palustris*, *Asclepias incarnata*, *Impatiens capensis*, *Sagittaria latifolia*, *Scutellaria lateriflora*, *Sparganium eurycarpum*, *Hibiscus moscheutos*, and *Verbena hastata*, may be present. In the west, forbs may include *Mentha arvensis*, *Polygonum amphibium*, *Epilobium ciliatum* and many others. Floating aquatics such as *Lemna minor* may predominate in deeper zones

Yosemite and environs

Locally all sampled stands of the *Typha* (*angustifolia*, *latifolia*) - (*Scirpus* spp.) Semipermanently Flooded Herbaceous Alliance form an open to intermittent layer of *Typha latifolia* averaging 39 percent cover. All other species are low cover and are only found in a third of the plots. These include such hydrophytic species as: *Equisetum arvense*, *Juncus effusus* var. *exiguus*, *Juncus mexicanus*, *Agastache urticifolia*, *Carex feta*, *Epilobium* sp., *Galium trifidum*, *Hypericum formosum*, *Leucanthemum vulgare*, *Mentha arvensis*, and *Ranunculus orthorhynchus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5 S4

RANK JUSTIFICATION This association is expected to be widespread in marshes throughout California and the Pacific states

DATABASE CODE

COMMENT

Globally

These relatively simple stands of one to three species of *Typha* and *Scirpus californicus* and/or *Scirpus acutus* have been anecdotally reported throughout many marshes in California from the coast to the inner valleys and deserts.

Yosemite and environs

Typha latifolia, *angustifolia*, and *dominigensis* are closely related species that often hybridize. Research in Suisun Marsh (Keeler-Wolf *et al.* 2000) suggested that it was not possible to consistently individuate stands with different *Typha* species either taxonomically or environmentally. Thus, though this type is listed as *Typha* (*angustifolia*, *latifolia*) - (*Scirpus* spp.) Alliance, it also includes other species of *Typha* such as *T. domingensis*. The alliance should probably be considered as a

Typha sp.-*Scirpus californicus* alliance, however to remain consistent with the existing alliance classification (Sawyer & Keeler-Wolf 1995).

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K36, 99S50, 99S55

SHRUB/SCRUB ASSOCIATIONS OF ECOLOGICAL ZONES I AND II

***Lupinus albifrons* Shrubland [Provisional]**

COMMON NAME	Silver Lupine Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Temperate broad-leaved evergreen shrubland
ALLIANCE	<i>Lupinus albifrons</i> Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Stands of *Lupinus albifrons* also occur in the central and north coast ranges in the East Bay Hills and in eastern Napa County (Keeler–Wolf pers. obs.) and are likely to occur elsewhere in cismontane California, as this species is found in nearly all counties of the state (Calflora database 2001).

Yosemite and environs

Stands of *Lupinus albifrons* Shrubland are sampled in the mapping area of Yosemite and environs within the El Portal, Kinsley, and Cherry Lake South 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Lupinus albifrons* Shrubland are found at extremely xeric sites at low elevations (1,500–4,700 feet) on the upper, mid, and low portions of southeast- to southwest-facing, undulating and linear, moderately steep to steep slopes. This association generally occurs in very hot, stony sites with a large percent of bedrock or large rocks (average 50% bedrock). Soils tend to be poorly developed and very shallow, skeletal, and stony with textures ranging from metamorphic to gneiss parent materials. Drainage is moderately well drained to rapid. Litter cover ranges from 5–40 percent cover. The amount of bare soil is high and ranges from 5–40 percent cover. Impact from disturbance is low to high and often includes invasion from exotic species.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Lupinus albifrons*
Herbaceous *Selaginella hansenii*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Lupinus albifrons*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Lupinus albifrons* Shrubland form a canopy of 7–10 percent cover at 1–2-meters tall. The understory herb layer is typically open with 5–20 percent cover at 0–0.5 meter tall and 5–50 percent cover at 0.5–1 meter tall. The *Clarkia unguiculata*, *Collinsia heterophylla*, *Gilia capitata*, *Melica californica*, and *Streptanthus tortuosus* species are constant in all of the samples, but only one, *Streptanthus tortuosus*, accounts for a cover greater than 2 percent. The herb with the highest cover in any of the plots is *Selaginella hansenii* (up to 15%) (2.5), but it only averages about 5 percent cover. Generally *Lupinus albifrons* is the sole shrub, with the exception of occasional light cover of *Arctostaphylos viscida* or *Toxicodendron diversilobum*. Average total cover of all species is low (18%). Other sites not sampled were observed to have cover of *Eriodictyon californicum* comparable to *L. albifrons*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Stands are poorly known and may be locally restricted.

DATABASE CODE To be determined

COMMENTS

Globally

Anecdotally, this alliance appears to also occur on road cuts and other steep rocky openings throughout its range.

Yosemite and environs

This association occurs in both transitional seral states as along road cuts as well as relatively long-persisting outcrop and steep slope settings where soil development is poor. Since the slopes are generally steep, invasive exotics are usually not as important in these stands as in other open shrub- or herb-dominated stands in the lower elevations of the west side of the mapping area.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K44, 99S53, 99S54

***Adenostoma fasciculatum* Shrubland [Provisional]**

COMMON NAME	Common Chamise Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE *Adenostoma fasciculatum* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. However, as this is a generic association characterized by the strong dominance of *Adenostoma fasciculatum*, it is likely that this association is widespread in the Sierra Nevada foothills and perhaps elsewhere in California.

Yosemite and environs

Stands of the *Adenostoma fasciculatum* Shrubland are sampled in the mapping area of Yosemite and environs within the El Portal, Kinsley, and Cherry Lake South 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Adenostoma fasciculatum* Shrubland are found at extremely xeric sites at low elevations (1,700–3,600 feet) on the mid portions of southeast- to southwest-facing, undulating and linear, moderately steep to steep slopes. This association generally occurs in hotter, drier sites such as mid to high slopes, ridge tops, and southwestern slopes off spur ridges and granitic intrusions. Soils tend to be moderately well developed and somewhat stony with textures ranging from loamy sand to clay loam from igneous, granitic, metamorphic, and gneiss parent materials. Drainage is moderately well drained to rapid. Litter cover ranges from 5–40 percent cover. The amount of bare soil is high and ranges from 5–40 percent cover. Impact from disturbance is low to high and often includes invasion from exotic species.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Adenostoma fasciculatum*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Adenostoma fasciculatum*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Adenostoma fasciculatum* Shrubland form a two-story structure with a continuous (60–70 percent cover at 2–5 meters tall and 5–90 percent cover at 1–2 meters tall) shrub layer dominated by *Adenostoma fasciculatum* that often occurs with *Ceanothus cuneatus*. Pure stands of *Adenostoma fasciculatum* are usually observed in slightly hotter environments. The understory herb layer is typically open with 5–20 percent cover at 0–0.5 meter tall and 5–50 percent cover at 0.5–1 meter tall. Occasionally common in this association are *Eriodictyon californicum* and cryptogamic crust. Other species that may also be found contributing to minor cover vary but may include *Vulpia myuros*, *Eriophyllum confertiflorum*, *Aira caryophyllea*, *Bromus hordeaceus*, *Daucus pusillus*, *Erodium cicutarium*, *Galium parisiense*, *Hypochaeris glabra*, *Pentagramma triangularis*, and *Trifolium microcephalum*. *Eriophyllum congdonii* is a rare species that may be found contributing to minor cover in this association.

OTHER NOTEWORTHY SPECIES

Eriophyllum congdonii is a List 1B species found in one of the four plots. This species occurs in Mariposa County and is usually found in chaparral, cismontane woodland, and lower montane coniferous forests on stony metamorphic sites at elevations of 1,650–6,200 feet. It is threatened by nonnative species (CNPS 2001).

CONSERVATION RANK G5?

RANK JUSTIFICATION Probably very widespread in California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

On some slopes in the Merced canyon small stands of this association are surrounded by nonnative-dominated grasslands. These islands appear to be the result of patchy burn patterns, suggesting that relatively high fire frequencies may lead to the reduction of this association.

Plots used to describe association (n=5)

USGS–NPS Veg Data: 98K6, 99K17, 98K20, 99S2, 99S6

Adenostoma fasciculatum - *Ceanothus cuneatus* Shrubland [Provisional]

COMMON NAME

Common Chamise – Sedgeleaf Buckbrush Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS Evergreen shrubland
PHYSIOGNOMIC GROUP Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE *Adenostoma fasciculatum* - *Ceanothus cuneatus* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. However, it is likely that this association is widespread in cismontane California. A similar association called *Adenostoma fasciculatum*/*Ceanothus cuneatus* association has been described from south coastal California (Gordon and White 1994). It is defined by high shared cover of *Adenostoma fasciculatum* and *Ceanothus cuneatus* but contains high constancy species such as *Yucca whipplei*, *Arctostaphylos glauca*, and *Eriogonum fasciculatum*, which do not occur locally.

Yosemite and environs

Stands of *Adenostoma fasciculatum* - *Ceanothus cuneatus* Shrubland are sampled in the mapping area of Yosemite and environs within the El Portal and Kinsley 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Adenostoma fasciculatum* - *Ceanothus cuneatus* Shrubland are found at xeric sites at low elevations (1,700–4,000 feet) on the midportions of generally linear and undulating, moderately steep to steep (10–16 degrees) slopes. These sites are usually found on upper canyon slopes and hill slopes. Soils tend to be moderately well developed with textures that range from sandy loam to clay loam from metamorphic, igneous, and granitic parent materials. Drainage is well drained to moderately well drained. Litter consists of 40–60 percent cover and bare soil consists of 15–50 percent cover.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Adenostoma fasciculatum*, *Ceanothus cuneatus*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Adenostoma fasciculatum*, *Ceanothus cuneatus*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Adenostoma fasciculatum* - *Ceanothus cuneatus* Shrubland consist of 5 percent cover at 0–0.5 meter tall, 5 percent cover at 0.5–1 meter tall, 70–90 percent cover at 1–2 meters tall, and sometimes 100 percent cover at 2–5 meters tall. This association forms a continuous shrub layer that is codominated by *Adenostoma fasciculatum* and *Ceanothus cuneatus*. Other species present in this association are *Arctostaphylos mewukka*, *Aira caryophyllea*, *Hypochaeris glabra*, *Daucus pusillus*, *Pentagramma triangularis*, *Vulpia myuros*, *Galium parisiense*, and *Erodium cicutarium*, all contributing minor cover. Other species that may occasionally be found in the stands include *Bromus arenarius*, *Trifolium microcephalum*, *Anaphalis margaritacea*, *Eriodictyon californicum*, and *Pellaea andromedifolia*. *Eriophyllum congdonii* is a rare species that may be found at this association.

OTHER NOTEWORTHY SPECIES

Eriophyllum congdonii is a List 1B species found in two of the six plots. This species occurs in Mariposa County and is usually found in chaparral, cismontane woodland, and lower montane coniferous forests on stony metamorphic sites at elevations of 1,650–6,200 feet. It is threatened by nonnative species (CNPS 2001).

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably widespread in the Sierra Nevada and elsewhere in northern California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Locally, this association has a tendency to be found on ridgelines and more gentle slopes compared to the *Adenostoma fasciculatum* association.

Plots used to describe association (n=5)

USGS–NPS Veg Data: 98M14, 99K10, 99K14, 99K9
Wieslander: 417

***Arctostaphylos viscida* Shrubland**

COMMON NAME

Whiteleaf Manzanita Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Evergreen shrubland

PHYSIOGNOMIC GROUP

Temperate broad-leaved evergreen shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE

Arctostaphylos viscida Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. However, the species is widespread in cismontane California in the Klamath Ranges and in the Sierra Nevada, thus is probably more common than indicated here.

Yosemite and environs

Stands of *Arctostaphylos viscida* Shrubland are sampled in the mapping area of Yosemite and environs within the Hetch Hetchy Reservoir 15-minute and El Portal, Buckingham Mountain, and Cherry Lake South 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Arctostaphylos viscida* Shrubland are found at xeric to dry mesic sites at low to midelevations (2,800–5,200 feet) of slopes with variable aspects but mostly south facing and on moderately steep drier north- and east-facing slopes. Slopes vary but can be moderately steep to fairly steep usually on the upper portions of east- to southeast-facing, somewhat steep slopes. Sites are usually located on ridge tops and tops of spurs off main ridges with soils that tend to be poorly developed to moderately well developed with textures ranging from sand to silt loam. Soils are well drained to rapidly draining. Parent material is either metamorphic or granitic. Litter can contribute 18–92 percent cover. Bare ground consists of 0–40 percent cover.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Arctostaphylos viscida*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Arctostaphylos viscida*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Arctostaphylos viscida* Shrubland, a successional association, consist of 5–20 percent cover at 0–0.5 meters tall, 5 percent cover at 0.5–1 meters tall, 5–40 percent cover at 1–2 meters tall, 10–60 percent cover at 2–5 meters tall, and 40 percent cover at 10–15 meters tall. This association forms open to continuous stands dominated by *Arctostaphylos viscida*. Often found in this association are isolated individuals and multiple juvenile *Calocedrus decurrens*, *Quercus kelloggii*, and *Chamaebatia foliolosa*. Occasionally, isolated or young *Pinus attenuata*, *Pinus ponderosa*, *Pinus jeffreyi*, *Quercus kelloggii*, and *Apocynum androsaemifolium* are present. A variety of other species present in this association may include *Ceanothus tomentosus*, *Eriodictyon californicum*, *Mimulus floribundus*, *Chlorogalum pomeridianum*, *Carex multicaulis*, *Ceanothus parvifolius*, *Ceanothus cordulatus*, *Chamaesyce serpyllifolia*, *Dendromecon rigida*, *Lupinus breweri*, and *Prunus emarginata*. This association is fairly common as a fire recovery association and species composition is highly variable.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5?

RANK JUSTIFICATION Likely to be a widespread association throughout northern California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Because of the seral nature of the stands we have elected to contain the alliance into one association locally. There is some tendency for a subassociation with more early seral characteristics to occur at lower elevations. This phase has *Dendromecon rigida* as a constant member and was originally individuated as a separate association in the interim classification.

Plots used to describe association (n=10)

USGS-NPS Veg Data: 98K21, 98K63, 99S27, 98K32, 98M8, 99K21, 99S24, 99S28, 98K18

NRI: 4

***Ceanothus cuneatus/Bromus* spp. Shrubland [Provisional]**

COMMON NAME	Wedgeleaf buckbrush/bromes Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE *Ceanothus cuneatus* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. However, it is likely that this association is widespread in cismontane California. This association has been observed elsewhere north and south in the Sierra Nevada foothills and likely occurs in the inner central coast foothills.

Yosemite and environs

Stands of *Ceanothus cuneatus/Bromus* spp. Shrubland are sampled in the mapping area of Yosemite and environs within the El Portal 7.5 minute and the Hetch Hetchy Reservoir 15 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus cuneatus*/*Bromus* spp. Shrubland are found at xeric sites at low to low-moderate elevations (2,340–5,320 feet) on the mid to upper portions of generally linear to convex, moderate to somewhat steep (10–30 degrees) slopes. Exposures are southerly ranging from southwest to south to southeast. These sites are usually found on upper canyon slopes and hill slopes. Soils tend to be moderately well developed with textures that range from loam to silt loam from metamorphic or granitic parent materials. Soils are generally well drained. Leaf litter cover may be relatively high ranging up to 58 percent cover and bare soil may be up to 30 percent cover.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Ceanothus cuneatus</i>
Herbaceous	<i>Hypochaeris glabra</i> , <i>Bromus madritensis</i> , <i>Bromus hordeaceus</i> , <i>Bromus arenarius</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Ceanothus cuneatus</i>
Herbaceous	<i>Bromus hordeaceus</i> , <i>Bromus arenarius</i>

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus cuneatus*/*Bromus* spp. Shrubland form an open shrub layer with a mixed herbaceous dicot and grass understory. Other important species include *Bromus madritensis* (15%), *Centaurea melitensis* (15%), *Hypochaeris glabra* (15%), *Bromus hordeaceus* (8.7%), and *Bromus arenarius* (7.75%). Other shrub species that may be present in this association but with low cover are *Arctostaphylos viscida* ssp. *mariposa*, *Rhamnus crocea* ssp. *ilicifolia*, *Toxicodendron diversilobum* and *Keckiella breviflora*. *Daucus pusillus*, *Pellaea mucronata*, *Trifolium microcephalum*, *Vulpia myuros*, *Galium parisiense*, and *Eriodictyon californicum* contribute low cover but occur with relatively high frequency. Other species that may occasionally be found in the stands include *Lessingia leptoclada*. *Eriophyllum congdonii* is a rare species that may be found in this association.

OTHER NOTEWORTHY SPECIES

Eriophyllum congdonii is a List 1B species found in one of the five plots. This species occurs in Mariposa County and is usually found in chaparral, cismontane woodland, and lower montane coniferous forests on stony metamorphic sites at elevations of 1,650–6,200 feet. It is threatened by nonnative species (CNPS 2001). *Centaurea melitensis*, found in one of the five plots, is an invasive alien species native to Europe and is listed by the California Exotic Pest Plant Council as a Wildland Pest Plant (California Pest Plants of Greatest Ecological Concern, CalEPPC 1999)

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably widespread in the Sierra Nevada and elsewhere in northern California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Locally, this association has a tendency to be found on gentler slopes compared to the *Adenostoma fasciculatum* association. Stands assigned to this association are somewhat disparate, occurring adjacent to low-elevation foothill woodlands and ranging up into glaciated valleys with sparser understory components. Additional sampling is needed to clarify type.

Plots used to describe association (n=5)

USGS–NPS Veg Data: 99S11, 99K37

NRI: 44

Wieslander: 411, 425

***Ceanothus integerrimus* - *Arctostaphylos viscida* - (*Arctostaphylos mewukka*) Shrubland [Provisional]**

COMMON NAME	Deer Brush – Whiteleaf Manzanita - (Indian Manzanita) Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold deciduous shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Temperate cold deciduous shrubland
ALLIANCE	<i>Ceanothus integerrimus</i> Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. This is another association that may be found to occur more widely with additional sampling in the Sierra Nevada and the Klamath Mountains.

Yosemite and environs

Stands of *Ceanothus integerrimus* - *Arctostaphylos viscida* - (*Arctostaphylos mewukka*) Shrubland are sampled in the mapping area of Yosemite and environs within the El Portal, Cherry Lake South, and El Capitan 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus integerrimus* - *Arctostaphylos viscida* - (*Arctostaphylos mewukka*) Shrubland are found at submesic to xeric sites at low to midelevations (2,000–5,200 feet) on the mid to upper portions of south- to north-facing, linear and convex, moderately steep to somewhat steep slopes. Soils are moderately well drained to well drained with textures ranging from loamy sand to sandy loam of igneous, metamorphic, and granitic parent materials. Litter is 40–88 percent cover. Disturbance at this association is common and includes mostly low and sometimes high impact levels from competition from exotics, logging, grazing, and fire.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Ceanothus integerrimus*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Ceanothus integerrimus*, *Arctostaphylos viscida*, *Arctostaphylos mewukka*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus integerrimus* - *Arctostaphylos viscida* - (*Arctostaphylos mewukka*) Shrubland consist of 3–20 percent cover at 0–0.5 meter tall, 5–20 percent cover at 0.5–1 meter tall, 5–50 percent cover at 1–2 meters tall, and 60–90 percent cover at 2–5 meters tall. This association forms a continuous shrub layer dominated by *Ceanothus integerrimus* and significantly less *Arctostaphylos viscida* and/or *Arctostaphylos mewukka*. Often found contributing to minor cover is *Pinus ponderosa*, *Bromus tectorum*, *Cercocarpus montanus* var. *glaber*, *Claytonia perfoliata*, *Vulpia microstachys*, *Elymus glaucus*, *Galium aparine*, and *Madia minima*. Occasionally, *Quercus garryana* var. *breweri*, *Toxicodendron diversilobum*, and moss may be common. Other species vary and may include *Adenostoma fasciculatum*, *Aesculus californica*, *Bromus arenarius*, *Bromus diandrus*, *Ceanothus cordulatus*, *Fragaria vesca*, *Lepechinia calycina*, *Potentilla glandulosa*, *Pteridium aquilinum*, *Ribes quercetorum*, and *Staphylea bolanderi*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Uncertain, but may prove to be common in the central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

The identification of *Arctostaphylos mewukka* and *Arctostaphylos viscida* are sometimes problematic and either one or the other or both species may occur in a stand. In general *Arctostaphylos mewukka* is more mesophytic than *Arctostaphylos viscida*.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K7, 99K27, 99S47

***Chamaebatia foliolosa*-*Arctostaphylos viscida* Dwarf-shrubland [Provisional]**

COMMON NAME	Mountain Misery-Whiteleaf Manzanita Dwarf-Shrubland
SYNONYM	none
PHYSIOGNOMIC CLASS	Dwarf-shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Creeping or matted needle-leaved or microphyllous evergreen dwarf-shrubland
ALLIANCE	<i>Chamaebatia foliolosa</i> Dwarf-shrubland Alliance [Provisional]
CLASSIFICATION CONFIDENCE LEVEL	2-1
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

The association is not known beyond the boundary of the Yosemite environs. The characteristic species are restricted, in combination, to the western slopes of the Sierra Nevada.

Yosemite and environs

This association is known from scattered locations throughout the western low to mid elevation regions of the park and environs. Samples are from the vicinity of Wawona, (Wawona quad.), Cherry Lake (Cherry Lake North quad), and Snyder Ridge (Buckingham Mountain quad).

ENVIRONMENTAL DESCRIPTION

Globally

Likely to be similar to the Yosemite and environs description below.

Yosemite and environs

This provisional association of this provisional alliance is typically a small patch community that is found in small openings surrounded by *Pinus ponderosa*-*Calocedrus decurrens* stands or within larger stands of *Arctostaphylos viscida* within elevation Zone 2 of the west side of the study area. Stands are usually less than 1 acre. Elevations range from 3900-5300 feet. Stands occur on moderate to steep slopes on mid to upper and high level slopes. Aspects are mostly

warm southerly to westerly (northwesterly). Soils are moderately well drained to rapidly drained on either granitic or metamorphic substrates. Soil texture ranges from sandy loam to clay loam. Litter and duff cover from 70-96 percent, large rocks and small rocks both average about 6% cover.

MOST ABUNDANT SPECIES

Globally

This association and alliance is only described from the Yosemite environs.

Yosemite and environs

Sub-Shrub *Chamaebatia foliolosa*

CHARACTERISTIC SPECIES

Globally

This association and alliance is only described from the Yosemite environs.

Yosemite and environs

Shrub *Arctostaphylos viscida*

Sub-Shrub *Chamaebatia foliolosa*

VEGETATION DESCRIPTION

Globally

This association is only known from the Yosemite environs, but is likely to be similar in composition elsewhere in the Sierra Nevada.

Yosemite and environs

This association has scattered shrubs of *Arctostaphylos viscida* emergent (to 3 meters) over a relatively dense ground layer composed of the sticky leaved aromatic subshrub *Chamaebatia foliolosa*. The canopy is less than 1 meter in height. *Chamaebatia foliosa* is the dominant species averaging 32% but ranging up to 70% cover. The shrub *Arctostaphylos viscida* averages about 2 percent cover and is scattered over the uniform subshrub cover. Emergent saplings of *Pinus ponderosa*, *Quercus kelloggii*, and *Calocedrus decurrens* may be present. Herbs are sparse and include occasional *Poa secunda*, *Poa bolanderi*, *Lotus humistratus*, *Lolium arundinaceum*, *Lithophragma bolanderi*, *Hieracium albiflorum*, *Gilia capitata*, *Galium bolanderi*, *Elymus glaucus*, *Dichelostemma capitatum*, *Cryptantha simulans*, *Claytonia perfoliata*, *Clarkia rhomboidea*, and *Linanthus montanus*. Exotic species are also sparse but include *Bromus tectorum*, *Hypochoeris glabra*, and *Aira caryophyllea*. All of these herbs average less than 1% cover apiece.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2?

RANK JUSTIFICATION This is probably of limited occurrence in the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Chamaebatia foliolosa is known to proliferate through resprouting of underground runners following fire and likely prefers relatively high fire frequencies. It is usually a forest or less regularly a tall shrub understory species and is only known to dominant in very small areas (most of the 400 square meter sample plots approximately equaled the size of the stand). As an alliance and association it is probably restricted by fire history and other disturbance events and may be a short -lived transition community.

The provisional map of the environs has identified 200 polygons of this vegetation. Thus, more should be sampled and their adjacent stands and disturbance histories studied, before further resolution can be made on the validity of this

alliance and association. The photo interpreters for the mapping project could see either strong dominance of *Chamaebatia foliolosa* or a combination of the *Arctostaphylos viscida* with the *Chamaebatia*. The combination of the sparse emergent tall *Arctostaphylos* and the low continuous mountain misery seems to be the likely typical expression of all stands of this alliance locally, however other combinations may exist.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99K31, 99K25, 99S38

Wieslander: **739**

FORESTS AND WOODLANDS OF ECOLOGICAL ZONES I AND II

***Quercus chrysolepis* - *Umbellularia californica* Forest**

COMMON NAME	Canyon Live Oak - California Bay Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Winter rain broad-leaved evergreen sclerophyllous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Lowland or submontane winter rain evergreen sclerophyllous forest

ALLIANCE *Quercus chrysolepis* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association is widespread in the Sierra Nevada south to at least Sequoia and Kings Canyon national parks.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Umbellularia californica* Forest are sampled in the westside mapping area of Yosemite and environs within the Lake Eleanor 7.5-minute; Yosemite and environs 15-minute, El Portal, South Cherry Lake, and Hetch Hetchy Reservoir 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Similar stands occur south to Sequoia National Park on moderate to steep slopes below 5,500 feet.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Umbellularia californica* Forest are found at low to midelevations (1,600–5,300 feet) on the low to upper portions of slopes of all aspects. This association is found on somewhat steep to very steep (20–65 degrees) stony slopes. Soils tend to be stony and well drained with textures ranging from stony to silty loam of granitic, metamorphic, and igneous parent material. Soil depths are shallow to moderately deep. These sites generally experience low to moderate disturbance.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*, *Umbellularia californica*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* - *Umbellularia californica* Forest form a moderately dense forest with 5–20 percent cover at 0–0.5 meter tall, 5–30 percent cover at 1–2 meters tall, 10–20 percent cover at 2–5 meters tall, 20 percent cover at 5–10 meters tall, 90 percent cover at 10–15 meters tall, 40–70 percent cover at 15–20 meters tall, and 10 percent cover at 20–35 meters tall. This association is dominated by *Quercus chrysolepis* in the overstory and *Umbellularia californica* in the understory tree layer, although *Umbellularia californica* is less abundant. In some stands *Quercus kelloggii* may be common (usually midelevations around 4,000–5,000 feet). In the preliminary classification, the *Quercus kelloggii* phase of this association was individuated. However, there is little justification for doing so because all other prominent species are shared. *Toxicodendron diversilobum* can be common in the shrub layer of some sites. *Dryopteris arguta* can be common in the herb layer of some sites. A variety of other species are also found in this association including *Aesculus californica*, *Quercus kelloggii*, *Pseudotsuga menziesii*, *Melica californica*, *Vulpia microstachys*, *Bromus tectorum*, *Selaginella hansenii*, and moss.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to occur commonly in the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association is widespread in the western Yosemite mapping area and is among the most common of the *Quercus chrysolepis* associations locally.

Plots used to describe association (n=20)

USGS–NPS Veg Data: 99K15, 99K50, 99K13, 99K22

NRI: 12, 13, 14, 15, 22, 42, 68, 71, 72, 73, 144, 321

Wieslander: 24, 418, 420, 687

***Quercus chrysolepis*/Arctostaphylos viscida Forest**

COMMON NAME	Canyon Live Oak/Whiteleaf Manzanita Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Winter rain broad-leaved evergreen sclerophyllous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Lowland or submontane winter rain evergreen sclerophyllous forest

ALLIANCE *Quercus chrysolepis* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis*/Arctostaphylos viscida Forest are sampled in the westside mapping area of Yosemite and environs within the Hetch Hetchy Reservoir, Buckingham Mountain, El Portal, Kinsley, and Lake Eleanor 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis*/Arctostaphylos viscida Forest are found on xeric sites at low to midelevations (1,600–6,200 feet) at the low to upper portions of linear slopes of all aspects. These sites tend to be moderately steep to steep (10–36 degree slopes) with a high level of sun exposure. This association is found on poorly developed, rapidly drained to somewhat poorly drained soils that are mostly shallow but occasionally have medium depths, and textures range from stony, sandy loam to clay loam that are derived from metamorphic, igneous, and granitic parent material. This association is often found on open, stony slopes with rock outcrops, benches, and granite slabs. Litter tends to be high (62–86% cover). Disturbance at these stands is usually low but can be moderate.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*
Shrub *Arctostaphylos viscida*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis*/*Arctostaphylos viscida* Forest usually form a two-story structure with an intermittent to continuous tree layer with 5–40 percent cover at 0–0.5 meter tall, 10 percent at 1–2 meters tall, 10–20 percent cover at 0.5–1 meter tall, 20–70 percent cover at 2–5 meters tall, 10–60 percent cover at 5–10 meters tall, 80 percent cover at 10–15 meters tall, 30–40 percent cover at 15–20 meters tall, and 5 percent cover at 35–50 meters tall. This association is dominated by *Quercus chrysolepis* in the tree layer and *Arctostaphylos viscida* in the shrub layer. *Toxicodendron diversilobum* is also commonly found in the shrub layer. A variety of other species is found in this association, although far less common or constant, including *Pinus attenuata*, *Pinus ponderosa*, *Pinus sabiniana*, *Pinus coulteri*, *Quercus wislizeni*, *Aesculus californica*, *Arctostaphylos mewukka*, *Ceanothus cuneatus*, *Cercis canadensis* var. *texensis*, *Chamaebatia foliolosa*, *Bromus diandrus*, and *Vulpia myuros*. Other species that may be found contributing to minor cover include *Pentagramma triangularis*, *Galium bolanderi*, *Melica californica*, *Symphoricarpos mollis*, *Dryopteris arguta*, *Rhamnus ilicifolia* (= *Rhamnus crocea* ssp. *ilicifolia*), and moss.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to occur throughout the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=17)

NPS-USGS Veg Data: 98M2, 99K33, 99K35, 99K42, 99K11, 99K19

NRI: 48, 227, 315, 319, 320

Wieslander: 718, 434, 432, 152, 120, 253

***Quercus chrysolepis*/*Arctostaphylos patula* Forest**

COMMON NAME	Canyon Live Oak/Greenleaf Manzanita Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest

PHYSIOGNOMIC GROUP Winter rain broad-leaved evergreen sclerophyllous forest
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Lowland or submontane winter rain evergreen sclerophyllous forest

ALLIANCE *Quercus chrysolepis* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2
USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely to occur throughout the Sierra Nevada and perhaps into the Klamath Province of northwestern California.

Yosemite and environs

Stands of *Quercus chrysolepis*/*Arctostaphylos patula* Forest were sampled in the low elevation westside mapping area of Yosemite and environs, most commonly within the Yosemite and environs 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis*/*Arctostaphylos patula* Forest are generally found at midelevations (4,900–7,700 feet) on the mid to upper portions of linear to convex-shaped slopes with eastern to southern aspects. These sites tend to be on moderate to steep (9–30 degrees) slopes. Soils tend to be shallow and poorly developed with textures ranging from stony loam, to stony, gravelly loam and of granitic parent material. Penetration is medium to difficult.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*
Shrub *Arctostaphylos patula*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis*/*Arctostaphylos patula* Forest form a two-story structure dominated by *Quercus chrysolepis* in the tree layer and *Arctostaphylos patula* in the shrub layer. A variety of other species found in this association,

although far less common and constant, may include *Arctostaphylos viscida*, *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), *Calocedrus decurrens*, *Pinus jeffreyi*, *Pseudotsuga menziesii*, *Pinus lambertiana*, *Quercus kelloggii*, *Ceanothus cordulatus*, and *Ceanothus integerrimus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Stands appear to be more localized than the previous two *Quercus chrysolepis* associations.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is the highest elevation association of the *Quercus chrysolepis* Forest Alliance locally.

Plots used to describe association (n=5)

NRI: 20, 46

Wieslander: 18, 38, 40

***Quercus chrysolepis* – *Pinus sabiniana* Forest**

COMMON NAME

Canyon Live Oak - Foothill Pine Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Winter rain broad-leaved evergreen sclerophyllous forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Lowland or submontane winter rain evergreen sclerophyllous forest

ALLIANCE

Quercus chrysolepis Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Pinus sabiniana* Forest are sampled in the lower elevation canyons of the westside mapping area of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Pinus sabiniana* Forest are found at low to midelevations (4,100–5,100 feet) on xeric to extremely xeric sites that have southeastern to northwestern aspects. These sites tend to be on convex-shaped, moderately steep to steep (14–36 degrees) slopes. This association is typically found on stony sites with poorly developed, shallow to deep soils with textures that range from stony to sandy loam and from granitic parent material. Penetrability is easy to difficult.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*, *Pinus sabiniana*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* - *Pinus sabiniana* Forest form an intermittent to open three-story structure dominated by *Quercus chrysolepis* and *Pinus sabiniana* in the tree layer. Rarely found are stands with greater than 50 percent cover of *Quercus chrysolepis*. *Arctostaphylos viscida*, *Toxicodendron diversilobum*, and *Ceanothus cuneatus* are commonly found contributing variable but usually sparse cover in the shrub layer. A large variety of other species may also be found contributing to minor cover in this association including *Calocedrus decurrens*, *Umbellularia californica*, *Quercus wislizeni*, *Aesculus californica*, *Adenostoma fasciculatum*, *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), *Bromus diandrus*, *Bromus tectorum*, *Linanthus montanus*, *Madia* sp. *Poa secunda*, *Vulpia microstachys*, *Vulpia myuros*, *Dichelostemma capitatum*, *Pseudotsuga menziesii*, *Rhamnus ilicifolia* (= *Rhamnus crocea* ssp. *ilicifolia*), and moss.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association is moderately common locally. It usually occurs at low elevation sheltered sites adjacent to relatively xeric stony locations.

Plots used to describe association (n=8)

USGS–NPS Veg Data: 99K23, 99K51, 99S19
Wieslander: 544, 61, 122, 71, 118

***Quercus chrysolepis/Dryopteris arguta* Forest**

COMMON NAME

Canyon Live Oak/Wood Fern Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Winter rain broad-leaved evergreen sclerophyllous forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Lowland or submontane winter rain evergreen sclerophyllous forest

ALLIANCE

Quercus chrysolepis Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely to range south to Sequoia and Kings Canyon national parks.

Yosemite and environs

Stands of *Quercus chrysolepis/Dryopteris arguta* Forest are found in the westside mapping area of Yosemite and environs within the Wawona, Cherry Lake, and El Portal 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis/Dryopteris arguta* Forest are found at low elevations (2,700–4,500 feet) on the mid to upper portions of linear, concave, and undulating, southwest- to north-facing, moderate to steep (15–40 degrees) slopes. Soils tend to be poorly developed with 1–20 percent exposed bedrock, 3–8 percent large rocks, and 3–5 percent small rocks. Soil textures are usually sandy loam but range from sandy loam to loam and are of igneous and granitic parent material. Drainage is somewhat poor to rapidly draining. Litter ranges from 40–77 percent cover. Disturbance at these sites tends to be low.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*
Shrub *Toxicodendron diversilobum*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*
Herbaceous *Dryopteris arguta*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis*/*Dryopteris arguta* Forest form a three-tiered structure with a continuous tree layer dominated by *Quercus chrysolepis*, an open shrub layer, and an intermittent herb layer dominated by *Dryopteris arguta*. Cover is 5–50 percent at 0–0.5 meter tall, 5–40 percent at 0.5–1 meter tall, 5–10 percent at 1–2 meters tall, 5–10 percent at 2–5 meters tall, 80 percent at 5–10 meters tall, 5–60 percent at 10–15 meters tall, and 5–70 percent at 15–20 meters tall. *Toxicodendron diversilobum*, *Salix lasiolepis*, and *Calycanthus occidentalis* are commonly found in the shrub layer. A variety of other species may be found contributing to less cover in this association including *Torreya californica*, *Acer macrophyllum*, *Umbellularia californica*, *Ceanothus integerrimus*, *Galium aparine*, *Claytonia perfoliata*, and *Woodwardia fimbriata*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is a closed-canopy forest, usually of steep mesic slopes. It resembles the *Quercus chrysolepis* - *Umbellularia californica* Forest but lacks significant cover of *Umbellularia*.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98M19, 99K30, 98K13, 98M11

***Quercus chrysolepis* – *Pinus ponderosa* Forest**

COMMON NAME	Canyon Live Oak - Ponderosa Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Winter rain broad-leaved evergreen sclerophyllous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Lowland or submontane winter rain evergreen sclerophyllous forest
ALLIANCE	<i>Quercus chrysolepis</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Pinus ponderosa* Forest are found in the westside of the mapping area of Yosemite and environs within the El Portal and Buckingham Mountain 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Pinus ponderosa* Forest are found at low to midelevations (1,900–6,100 feet) on mesic to submesic sites. These sites are typically on linear, undulating, convex- and concave-shaped slopes with southern to northern aspects and are often on steep slopes (27–45 degrees). Soils tend to be shallow to well deep with textures ranging from stony, gravelly sand to clay loam from metamorphic and granitic parent material. Drainage is well drained to rapidly drained. Litter ranges from 82–94 percent cover. Disturbance by invasion of exotics is high.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*, *Pinus ponderosa*, *Quercus kelloggii*, *Pinus lambertiana*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* - *Pinus ponderosa* Forest form a three-story structure with 20–70 percent cover at 0–0.5 meter tall, 5–20 percent at 1–2 meters tall, 5–20 percent at 2–5 meters tall, 5 percent at 5–10 meters tall, 20–30 percent at 10–15 meters tall, and 5 percent at 35–50 meters tall. The emergent nature of the *Pinus ponderosa* over a denser canopy of *Quercus chrysolepis* is evident in all stands sampled. The open to intermittent tree layer is dominated by *Quercus chrysolepis* and *Pinus ponderosa* although *Quercus kelloggii* and *Pinus lambertiana* are also important. *Pseudotsuga menziesii*, *Pinus attenuata*, *Calocedrus decurrens*, and *Abies concolor* are occasionally present in this association. The shrub layer is often open with predominantly *Chamaebatia foliolosa* and *Toxicodendron diversilobum*. The herb layer is open to continuous with mostly *Galium bolanderi* and *Asarum hartwegii*; however, a variety of other understory species may be found contributing to minor cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is a transitional community between the Ponderosa pine woodland alliance and the Canyon live oak forest alliance. Further sampling may determine that it is more reasonable to assign the stands classified in this association as members of the *Pinus ponderosa* Woodland Alliance. However, the cover of *Pinus ponderosa* relative to *Quercus chrysolepis* is low.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K29, 99S22

Wieslander: 172

***Quercus chrysolepis* - *Calocedrus decurrens* Forest**

COMMON NAME

Canyon Live Oak - Incense Cedar Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Winter rain broad-leaved evergreen sclerophyllous forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Lowland or submontane winter rain evergreen sclerophyllous forest

ALLIANCE *Quercus chrysolepis* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association occurs at least as far south as Sequoia National Park.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Calocedrus decurrens* Forest were sampled within the Hetch Hetchy Reservoir 15-minute and Lake Eleanor 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* – *Calocedrus decurrens* Forest are found at low to midelevations (4,400–5,200 feet) on southeast- to southwest-facing, moderately steep to somewhat steep (5–21 degrees) slopes.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus chrysolepis*, *Calocedrus decurrens*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus chrysolepis* - *Calocedrus decurrens* Forest form a three-story structure with an open to intermittent tree layer dominated by *Quercus chrysolepis* and *Calocedrus decurrens*. Often found in this association and contributing to less cover is *Quercus kelloggii* and *Pinus ponderosa*. Occasionally, *Umbellularia californica* is found in low cover. Rarely, *Abies concolor* is in this association. The understory shrub and herb layer are sparse and may include *Ceanothus*

integerrimus, *Lonicera interrupta*, *Agoseris retrorsa*, *Clarkia rhomboidea*, *Elymus stebbinsii*, *Gilia capitata* ssp. *mediomontana*, *Keckiella breviflora*, *Lupinus grayi*, *Lupinus stiversii*, and *Symphoricarpos mollis*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Uncertain, likely to be relatively uncommon and localized.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is another transitional association between the Canyon live oak forest alliance and the Ponderosa pine – incense cedar alliance. Cover of the emergent conifers is low, while cover of the canyon live oak is relatively high. See *Calocedrus decurrens* alliance descriptions for semiriparian stands with high *Calocedrus decurrens* and relatively low cover of *Quercus chrysolepis*. Although poorly sampled, these stands are notable in ravines and along narrow steep streams in several parts of the park and environs.

Plots used to describe association (n=3)

NRI: 2, 3, 298

***Pinus ponderosa* - *Calocedrus decurrens*/ *Chamaebatia foliolosa* Forest**

COMMON NAME	Ponderosa Pine – Incense Cedar/Mountain Misery Forest
SYNONYM	
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus ponderosa</i> - <i>Calocedrus decurrens</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Don Potter (pers. com. 2002) has about 20 plots collected from elsewhere in the Sierra, but these have not been summarized yet.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens*/ *Chamaebatia foliolosa* Forest are found throughout the lower elevation westside portion of the mapping area of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens*/ *Chamaebatia foliolosa* Forest are found in moderately xeric upland sites at midelevations (5,800–6,400 feet) on the mid to upper portions of south- to southwest-facing slopes. These sites tend to be undulating to linear and gentle to moderately steep (0–14 degrees). These sites generally have well developed (occasionally poorly developed) soils with textures ranging from stony, gravelly loam to loam of granitic parent material. Penetrability tends to be easy to moderate, and soil depths are medium to deep.

MOST ABUNDANT SPECIES

Globally

This association is only described from Yosemite. Information about its global characteristics is not available without additional inventory and summarization.

Yosemite and environs

Tree	<i>Pinus ponderosa</i> , <i>Calocedrus decurrens</i>
Shrub	<i>Arctostaphylos patula</i> , <i>Chamaebatia foliolosa</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus ponderosa*, *Calocedrus decurrens*
Shrub *Chamaebatia foliolosa*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens*/*Chamaebatia foliolosa* Forest form a two-story structure with an intermittent to nearly closed tree layer dominated by *Pinus ponderosa* and *Calocedrus decurrens* and a shrub layer dominated by *Chamaebatia foliolosa* and sometimes with *Arctostaphylos patula* with highly variable cover depending on overstory cover.

CONSERVATION RANK G4?

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This association is likely to be widespread in the central and southern Sierra Nevada.

Yosemite and environs

Compared to *Pinus ponderosa* - *Calocedrus decurrens* - *Quercus kelloggii* Forest, this type is usually more open with a better developed shrub or subshrub understory.

Plots used to describe association (n=6)

NRI: 86, 299, 264,
Wieslander: 558, 705, 282

Pinus ponderosa - *Calocedrus decurrens* – *Quercus kelloggii* Forest

COMMON NAME

Ponderosa Pine - Incense Cedar - Black Oak Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Pinus ponderosa - *Calocedrus decurrens* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only described from Yosemite. Information about its global characteristics is not available without additional inventory and summary. Don Potter (pers. Com 2002) has sampled about 20 plots elsewhere in the Sierra Nevada.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens* – *Quercus kelloggii* Forest are sampled in the mapping area of Yosemite and environs within the Lake Eleanor 7.5-minute; El Capitan, El Portal, Wawona, Buckingham Mountain, and Hetch Hetchy Reservoir 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens* – *Quercus kelloggii* Forest are found at submesic to mesic environments at low to midelevations (2,400–6,700 feet). This association is found on variable sites. This association is found on basins and low to high slopes of hills and mountains with slopes that are flat to steep (0–36 degrees). Aspect is highly variable but is mostly south facing. Soil properties vary with textures from coarse and gravelly to silt loam, and depth is shallow to deep. Penetrability is easy to moderate. Drainage is very poorly drained to well drained. Parent material is granitic. Disturbance at this association is none to moderate. Fire is a common disturbance in this association. Litter cover is usually high but ranges from 15–90 percent cover.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus ponderosa*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus ponderosa*, *Calocedrus decurrens*, *Quercus kelloggii*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens* - *Quercus kelloggii* Forest form a three-story structure with 0–80 percent cover at 0–0.5 meter tall, 5–10 percent cover at 0.5–1 meter tall, 0–20 percent cover at 1–2 meters tall, 5 percent cover at 2–5 meters tall, 10–50 percent cover at 5–10 meters tall, 10–70 percent cover at 10–15 meters tall, 20 percent cover at 15–20 meters tall, 0–40 percent cover at 20–35 meters tall, 10 percent cover at 35–50 meters tall, and 20–50 percent cover at greater than 50 meters tall. The intermittent to nearly closed tree layer is dominated by *Pinus ponderosa*, *Calocedrus decurrens*, and *Quercus kelloggii*. At upper elevations, *Pinus lambertiana* is also important. *Abies concolor*, *Quercus vaccinifolia*, and *Pseudotsuga menziesii* are rarely present. The open understory layer is highly variable and may include *Ceanothus integerrimus*, *Ceanothus cordulatus*, *Chamaebatia foliolosa*, *Arctostaphylos patula*, *Arctostaphylos viscida*, *Toxicodendron diversilobum*, *Pteridium aquilinum*, *Lupinus breweri*, *Apocynum androsaemifolium*, and *Galium bolanderi*. *Carex tompkinsii* is a rare species that may be found in this association.

OTHER NOTEWORTHY SPECIES

Carex tompkinsii is a List 4 species (CNPS 2001) found at one of the 32 plots. It usually is found in chaparral, cismontane woodland, lower montane coniferous forests, and upper montane coniferous forest at 1,400–6,000 feet. This plant is found within Fresno, Mariposa, and Tuolumne counties.

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to be widespread in the Sierra Nevada

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is the most closed and mesic of the locally represented Ponderosa pine-Incense cedar associations. It may range to semiriparian with an understory of *Rubus leucodermis* (blackcap raspberry). As slopes steepen, cover of the canopy opens and this association gives way to *Pinus ponderosa* - *Calocedrus decurrens*/*Chamaebatia foliolosa* Forest on moderately steep and sunny slopes, and on steeper stony slopes it gives way to *Pinus ponderosa* - *Calocedrus decurrens* - *Quercus chrysolepis*/*Chamaebatia foliolosa* Forest.

Plots used to describe association (n=33)

USGS–NPS Veg Data: 98K23, 98K24, 98K31, 98K65, 98M16, 98M23, 98M25, 98M5, 98K16
NRI: 80, 82, 83, 316, 267, 268, 102, 103, 17, 23
Wieslander: 540, 16, 445, 451, 452, 467, 474, 440, 57, 81, 116, 176, 46, 95

Pinus ponderosa - *Calocedrus decurrens* - *Quercus chrysolepis*/*Chamaebatia foliolosa* Forest

COMMON NAME	Ponderosa Pine - Incense Cedar - Canyon Live Oak/Mountain Misery Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus ponderosa</i> - <i>Calocedrus decurrens</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association occurs throughout the central and southern Sierra Nevada.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens* - *Quercus chrysolepis*/*Chamaebatia foliolosa* Forest are sampled in the mapping area of Yosemite and environs within the Buckingham Mountain, El Capitan, Lake Eleanor 15-minute and Lake Eleanor 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens* - *Quercus chrysolepis*/*Chamaebatia foliolosa* Forest are found at submesic environments of low to midelevations (4,200–5,600 feet) on the mid to upper portions of southeast-, southwest-, to west-facing, gentle to steep (2–28 degrees) slopes. Soils are usually poorly developed and sometimes stony. Depths are shallow to medium, and textures range from stony to silt loam and of granitic parent material. Penetrability is easy to difficult. Fire is fairly frequent in this association.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus ponderosa*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus ponderosa*, *Calocedrus decurrens*, *Quercus chrysolepis*
Shrub *Chamaebatia foliolosa*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Calocedrus decurrens* – *Quercus chrysolepis*/*Chamaebatia foliolosa* Forest form open to moderately closed stands dominated by *Pinus ponderosa*, *Calocedrus decurrens*, *Quercus chrysolepis*, and *Chamaebatia foliolosa*. *Chamaebatia foliolosa* understory density is highly variable depending on the openness of the canopy. *Quercus kelloggii* is sometimes present. *Quercus kelloggii* appears to fare better than the *Quercus chrysolepis* on the less steep and locally less rocky microsites within the stands. *Pinus ponderosa* and *Umbellularia californica* may sometimes be present in the overstory. *Toxicodendron diversilobum*, *Arctostaphylos patula*, *Arctostaphylos viscida*, and *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*) may sometimes be present in the understory.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to be common in the central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

The putative association: *Pinus ponderosa* - *Calocedrus decurrens*/*Chamaebatia foliolosa* Forest listed in the preliminary classification was incorporated into this association because of the many similarities, especially species composition.

Plots used to describe association (n=5)

USGS–NPS Veg Data: 99K34, 99K46

NRI: 299

Wieslander: 737, 438

***Calocedrus decurrens* - *Alnus rhombifolia* Forest**

COMMON NAME

Incense Cedar - White Alder Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Calocedrus decurrens Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Wetland, Riparian

RANGE

Globally

This association is only described from Yosemite. Information about its global characteristics is not available without additional inventory. It likely occurs in other areas in the Sierra Nevada and perhaps in the Klamath Mountains of California. Don Potter (pers com 2002) has sampled approximately 74 plots in this association throughout the Sierra.

Yosemite and environs

Stands of *Calocedrus decurrens* - *Alnus rhombifolia* Forest are sampled in Zones I and II of the mapping area of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Calocedrus decurrens* - *Alnus rhombifolia* Forest are found at low elevations (4,100–5,800 feet) on the lower portions of slopes, usually along streamsid es with variable aspects, and on generally concave, moderately steep to slightly

steep slopes. These sites are seasonally flooded to saturated. Soils are from granitic parent material. Sites may occur in narrow riparian corridors along small streams or on broader alluvial terraces adjacent to larger streams.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Calocedrus decurrens*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Calocedrus decurrens*, *Alnus rhombifolia*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Calocedrus decurrens* - *Alnus rhombifolia* Forest are dominated by *Calocedrus decurrens* with relatively less *Alnus rhombifolia*. Rarely, *Alnus rhombifolia* is more common. Usually, *Pinus ponderosa* or *Pinus lambertiana* are present, and *Abies concolor* is occasionally present. Other species present may include *Cornus* sp., *Salix exigua*, *Rhododendron occidentale*, *Corylus cornuta*, and *Rubus parviflorus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION These stands are likely to be common throughout the central and southern Sierra Nevada but of small total acreage. Site quality outside of protected areas may be frequently diminished by logging and streambed alteration.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type is ecologically similar to the *Alnus rhombifolia* association, where *Alnus rhombifolia* is the dominant along well watered stream channels. *Calocedrus decurrens* is the most mesophytic conifer in the low elevation westside of the Sierra and frequently overlaps with *Alnus rhombifolia* within the riparian zone.

Plots used to describe association (n=8)

Potter: 2030, 659, 649, 642, 662, 634, 635

Wieslander: 332 (This is not a Wieslander plot, could it be Potter?)

***Pseudotsuga menziesii* - *Abies concolor* - *Calocedrus decurrens* Forest**

COMMON NAME	Douglas-Fir - White Fir – Incense Cedar Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pseudotsuga menziesii* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association occurs throughout the northern Sierra Nevada and southern Cascades (Fites, 1994) at least as far south as Yosemite Valley. Don Potter (pers com 2002) has sampled this association near Carlon. The southern range limit is probably Big Creek near Huntington Lake, Fresno County.

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Abies concolor* - *Calocedrus decurrens* Forest are sampled within the mapping area of Yosemite and environs in the El Capitan and Half Dome 7.5 minute topographic quadrangles and in the vicinity of Hodgdon Ranch in the Tuolumne River drainage.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Pseudotsuga menziesii* - *Abies concolor* - *Calocedrus decurrens* Forest are found at low elevations (2,100–4,800 feet) at cool, moist sites with humid air. These sites tend to occur on north- or northeast-facing, gentle to moderately steep (12–80%), lower or mid slopes. Sites are often adjacent to perennial streams generally occupying small areas. Soils are moderately deep to deep in metamorphic or volcanic substrates. Coarse fragments tend to be higher in this association. Fire is infrequent, with low to medium intensities and variable spread (Fites, 1994).

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Abies concolor* - *Calocedrus decurrens* Forest are found at low to midelevations (4,000–6,200 feet) on the channel bed to midportion of northwest- to northeast-facing, flat to somewhat steep (0–38%) slopes. Soil are generally deep but can be shallow with textures ranging from stony to sandy, loamy clay of granitic parent material. Penetrability is easy to moderate. Litter ranges from 45–65 percent cover.

MOST ABUNDANT SPECIES

Globally

Tree *Pseudotsuga menziesii*, *Abies concolor*, *Calocedrus decurrens*, *Pinus ponderosa* (Fites, 1994)

Yosemite and environs

Tree *Pseudotsuga menziesii*, *Abies concolor*, *Calocedrus decurrens*

CHARACTERISTIC SPECIES

Globally

Tree *Pseudotsuga menziesii*, *Abies concolor*, *Calocedrus decurrens*, *Pinus ponderosa*, *Pinus lambertiana* (Fites, 1994)

Herbaceous *Adenocaulon bicolor*, *Trichostema lanceolatum*

Yosemite and environs

Tree *Pseudotsuga menziesii*, *Abies concolor*, *Calocedrus decurrens*

VEGETATION DESCRIPTION

Globally

Stands of *Pseudotsuga menziesii* - *Abies concolor* - *Calocedrus decurrens* Forest form a dense, multilayered overstory of *Pseudotsuga menziesii*, *Abies concolor*, and *Calocedrus decurrens*. *Corylus cornuta* is in the shrub layer, and dense patches of both or either *Adenocaulon bicolor* or *Trichostema lanceolatum* are in the herb layer. *Pseudotsuga menziesii* dominates and occasionally codominates with *Abies concolor*. *Calocedrus decurrens*, *Pinus lambertiana*, and occasionally *Pinus ponderosa* are minor associates. Infrequently, *Taxus brevifolia* and *Torreya californica* are present. *Pseudotsuga menziesii* dominate the regeneration, but *Abies concolor* and *Calocedrus decurrens* can also be high or dominant. *Quercus kelloggii*, *Pinus lambertiana*, and *Cornus nuttallii* are common in low amounts. *Quercus chrysolepis* occurs in the overstory and midstory on sites with limiting soil conditions, either shallow and stony sites with limited rootability or very high coarse fragments. *Corylus cornuta* forms a tall shrub layer of variable cover. The herb layer is well developed with dense patches dominated by *Adenocaulon bicolor* and *Trichostema lanceolatum* (Fites, 1994).

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Abies concolor* - *Calocedrus decurrens* Forest form a dense overstory and open understory codominated by *Pseudotsuga menziesii*, *Abies concolor*, and *Calocedrus decurrens* in the tree canopy and a variety of species in the understory. *Pinus lambertiana* and *Quercus kelloggii* are commonly present. *Acer macrophyllum*, *Quercus chrysolepis*, *Pinus jeffreyi*, *Alnus rhombifolia*, and *Umbellularia californica* may also be present. The understory shrub layer may include *Chamaebatia foliolosa*, *Ceanothus integerrimus*, and *Corylus cornuta*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be widespread in the northern and central Sierra Nevada, but many stands have been logged.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

The largest stands occur in the Tuolumne River drainage near Hodgdon Ranch, Hardin Flat, and Gold Arrow Road north of the north entrance of the park.

Plots used to describe association (n=7)

USGS-NPS Veg Data: 99K47, 99S51

Wieslander: 361, 407, 262, 134

Potter: 660

Pseudotsuga menziesii - *Pinus ponderosa* - *Calocedrus decurrens* Forest

COMMON NAME	Douglas-Fir - Ponderosa Pine - Incense Cedar Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pseudotsuga menziesii* - *Pinus ponderosa* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Pinus ponderosa* - *Calocedrus decurrens* Forest are sampled in the mapping area of Yosemite and environs within the Cherry Lake South 7.5 minute topographic quadrangles. However, there are other stands in the area as far south as the south fork of the Merced River drainage west of Wawona.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Pinus ponderosa* - *Calocedrus decurrens* Forest are found at mesic sites at low to midelevations (4,600–5,900 feet) on concave and linear, north- and northwest-facing, moderately steep to steep (15–60%) slopes. Soils are typically medium to deep and well developed with textures that are mostly loams but can be stony. Parent material is usually granitic but is occasionally gabbro. Penetrability is easy to medium. Fire has been generally suppressed in these areas.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pseudotsuga menziesii*, *Calocedrus decurrens*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pseudotsuga menziesii*, *Pinus ponderosa*, *Calocedrus decurrens*
Shrub *Chamaebatia foliolosa*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Pinus ponderosa* - *Calocedrus decurrens* Forest form a two-story structure with an intermittent tree layer dominated by *Pseudotsuga menziesii*, *Pinus ponderosa*, and *Calocedrus decurrens*. *Quercus kelloggii* and *Pinus lambertiana* are also usually present in the tree layer. *Abies concolor* can be found contributing to minor cover at higher elevations. *Chamaebatia foliolosa* is often dominant in the shrub layer. *Toxicodendron diversilobum*, *Ceanothus integerrimus*, *Ceanothus* sp., *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), and *Arctostaphylos patula* may be present in the shrub layer.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be widespread in the northern and central Sierra Nevada, but many stands have been logged.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=5)

USGS-NPS Veg Data: 99S26

Wieslander: 150, 144, 166, 175

***Pseudotsuga menziesii* - *Quercus chrysolepis* Forest**

COMMON NAME	Douglas-Fir - Canyon Live Oak Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pseudotsuga menziesii</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is also known from the Shasta–Trinity National Forest in the Klamath Province of northwestern California (Taylor and Teare 1979).

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Quercus chrysolepis* Forest were sampled within the Half Dome and El Capitan 7.5-minute topographic quadrangles. Particularly noticeable are the stands on the Wawona Road just below the Inspiration Point tunnel.

ENVIRONMENTAL DESCRIPTION

Globally

According to Taylor and Teare (1979) this association is the most widespread in their study area, occurring at low elevations (below 4,500 feet) on north-facing slopes, but shifting to southerly exposures at higher elevations (between 4,500 and 5,500 feet). The substrate is all pre-Cretaceous metamorphic rock, and the soils are largely Sheetiorn–Josephine complex with annual precipitation averaging about 40 inches (1,018 mm).

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Quercus chrysolepis* Forest are found at mesic site with some cold air drainages, on low to midelevations (4,000–5,300 feet). It is generally restricted to steep canyons along Yosemite Valley and the Hetch Hetchy Reservoir. Aspects are generally northerly but can be trending south (northeast to west) at its highest elevations in semiprotected locations above the Yosemite Valley. Often associated with riparian drainages, these sites are on moderate to somewhat steep (6–26 degrees), convex slopes. Soil development is minimal with shallow to medium depths, and textures are mostly stony but range from stony to clay and of granitic parent material. Penetrability is easy to difficult.

MOST ABUNDANT SPECIES

Globally

This association has been described by Taylor and Teare (1979). However, their description only includes stands in the southern Klamath Province. There, in addition to the abundant *Pseudotsuga menziesii* and *Quercus chrysolepis*, other species such as *Arbutus menziesii* and *Acer macrophyllum* are common, while they are rare or absent in the local stands of this association.

Yosemite and environs

Tree *Pseudotsuga menziesii*, *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

Similar stands have been described by Taylor and Teare (1979) with *Pseudotsuga menziesii* and *Quercus chrysolepis* as characteristic. However, these stands differ somewhat from the local Yosemite stands (see abundant species category above). Thus this association may actually be different despite the similarity of the two main species.

Yosemite and environs

Tree *Pseudotsuga menziesii*, *Quercus chrysolepis*

VEGETATION DESCRIPTION

Globally

These stands as defined in the Klamath Ecoregion by Taylor and Teare (1979) but these differ somewhat from the local Yosemite stands (see abundant species category, above). Thus, this association may actually be found to be different although the two main species are the same.

Yosemite and environs

Stands of *Pseudotsuga menziesii* - *Quercus chrysolepis* Forest are dominated by *Pseudotsuga menziesii* and *Quercus chrysolepis*. *Calocedrus decurrens*, *Umbellularia californica*, *Pinus ponderosa*, and *Quercus kelloggii* are often present in the tree canopy. Other species that may be present include *Abies concolor*, *Alnus rhombifolia*, *Alnus incana*, *Acer*

macrophyllum, *Cornus nuttallii*, *Rhododendron occidentale*, *Toxicodendron diversilobum*, *Ceanothus integerrimus*, *Corylus cornuta*, *Arctostaphylos viscida*, *Arctostaphylos patula*, and *Pteridium aquilinum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION High-quality old growth stands are relatively uncommon as a result of logging and improper fire regimes.

DATABASE CODE To be determined

COMMENTS

Globally

See Taylor, D.W., and K.A. Teare. 1979. Ecological survey of the vegetation of the proposed Trelorita Research Natural Area, Shasta-Trinity National Forest, Trinity County, California. Unpublished report. USDA Forest Service, Pacific Southwest Research Station, Berkeley, CA.

Yosemite and environs

Often on steep stabilized talus at the base of north-facing cliffs in Yosemite Valley.

Plots used to describe association (n=10)

USGS-NPS Veg Data: 98M22

NRI: 146, 147, 148, 34

Wieslander: 437, 449, 450, 453, 354

***Quercus kelloggii*/Arctostaphylos mewukka - Chamaebatia foliolosa Forest [Provisional]**

COMMON NAME

Black Oak/Indian Manzanita – Mountain Misery Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Mixed evergreen deciduous forest

PHYSIOGNOMIC GROUP

Mixed broad-leaved evergreen - cold deciduous forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Mixed broad-leaved evergreen - cold deciduous Forest

ALLIANCE

Quercus kelloggii Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association ranges from the northern to the southern Sierra Nevada including Sequoia and King Canyon national parks.

Yosemite and environs

Stands of *Quercus kelloggii*/Arctostaphylos mewukka - Chamaebatia foliolosa Forest are sampled in the mapping area of Yosemite and environs within the Buckingham Mountain and Ascension Mountain 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus kelloggii*/Arctostaphylos mewukka - Chamaebatia foliolosa Forest are found at low elevations (3,800–4,500 feet) on the upper portions of southeast- to west-facing, moderately steep to somewhat steep (6–25 degrees) slopes of canyons and ridges. Landform is variable; sites are located on linear, convex, and undulating slopes, ridges, and canyons. Soil textures range from loamy sand to silt loam and of granitic parent material. Soils are moderately well drained to well drained. Litter is high with 75–80 percent cover.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus kelloggii*
Shrub *Arctostaphylos mewukka*, *Chamaebatia foliolosa*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus kelloggii*
Shrub *Arctostaphylos mewukka*, *Chamaebatia foliolosa*
Herb *Galium bolanderi*, moss

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus kelloggii*/*Arctostaphylos mewukka* - *Chamaebatia foliolosa* Forest form a three-story structure with 5–50 percent cover at 0–0.5 meter tall, 10–20 percent cover at 1–2 meters tall, 5–40 percent cover at 2–5 meters tall, 5–30 percent cover at 5–10 meters tall, and 10–20 percent cover at 10–15 meters tall. The open to intermittent tree layer is dominated by *Quercus kelloggii*. *Calocedrus decurrens*, *Pinus ponderosa*, and *Pinus attenuata* are sometimes found contributing minor cover in the tree layer. *Chamaebatia foliolosa* and *Arctostaphylos mewukka* are dominant in the open to intermittent shrub layer. *Arctostaphylos viscida* is often present. *Adenostoma fasciculatum* is occasionally found in this association as well. *Galium bolanderi* and moss are usually found in the open to intermittent herb layer. A large variety of other species are also found in this association, contributing little cover in the understory including *Agoseris grandiflora*, *Poa secunda*, *Toxicodendron diversilobum*, *Lathyrus sulphureus*, *Vulpia microstachys*, *Ceanothus integerrimus*, *Ceanothus cuneatus*, and *Comandra umbellata* ssp. *californica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Stands are relatively small and scattered in the area and likely elsewhere in its range.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Some confusion exists between the identification of *Arctostaphylos viscida* and *Arctostaphylos mewukka*. Thus, some stands probably contain both species, while others may only contain one or the other. In general, these stands occur at the interface between Zone I and Zone II where chaparral gives way to forests of black oak. Fire frequency is relatively high in these stands, and the individual oaks are often multitemmed.

Plots used to describe association (n=3)

USGS-NPS Veg Data: 99S23, 99S25, 99S37

Quercus kelloggii/*Arctostaphylos patula* Forest

COMMON NAME	Black Oak/Greenleaf Manzanita Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Mixed evergreen deciduous forest
PHYSIOGNOMIC GROUP	Mixed broad-leaved evergreen - cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Mixed broad-leaved evergreen - cold deciduous forest
ALLIANCE	<i>Quercus kelloggii</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is found in the Sierra Nevada from Tulare to Sierra counties (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus kelloggii*/*Arctostaphylos patula* Forest are sampled in the mapping area of Yosemite and environs within the Yosemite 15-minute and White Chief Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Quercus kelloggii*/*Arctostaphylos patula* Forest are found at low to midelevations (4,600–7,100 feet) on west- and south-facing slopes that are primarily less than somewhat steep (< 20 degrees). Soil textures are usually loams and are often from granitic and sometimes andesitic parent material (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus kelloggii*/*Arctostaphylos patula* Forest are found at midelevations (5,000–6,000 feet) on southwest- and north-facing slopes that are somewhat steep to abrupt (15–99 degrees). Soils are poorly developed with textures ranging from stony to sandy loam and are commonly from granitic parent material. Exposed bedrock can consist of 35 percent cover with 15 percent cover for large rock and 15 percent cover for small rocks. Litter cover is generally 20 percent.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Quercus kelloggii</i>
Shrub	<i>Arctostaphylos patula</i> , <i>Ceanothus cordulatus</i>

Yosemite and environs

Tree	<i>Quercus kelloggii</i>
Shrub	<i>Arctostaphylos patula</i> , <i>Ceanothus cordulatus</i>

CHARACTERISTIC SPECIES

Globally

Tree *Quercus kelloggii*, *Calocedrus decurrens*
Shrub *Arctostaphylos patula*, *Ceanothus cordulatus*

Yosemite and environs

Tree *Quercus kelloggii*, *Calocedrus decurrens*
Shrub *Arctostaphylos patula*, *Ceanothus cordulatus*

VEGETATION DESCRIPTION

Globally

Stands of *Quercus kelloggii*/*Arctostaphylos patula* Forest are dominated by *Quercus kelloggii* in the tree layer with an understory shrub layer of *Arctostaphylos patula* and *Ceanothus cordulatus*. *Calocedrus decurrens* may also be quite common in this association. Other species may include *Abies concolor*, *Pinus ponderosa*, *Pinus jeffreyi*, *Ceanothus integerrimus*, *Prunus emarginata*, *Chrysolepis sempervirens* (= *Castanopsis sempervirens*), *Chamaebatia foliolosa*, and *Arctostaphylos mewukka*. Rarely occurring are *Pseudotsuga menziesii*, *Quercus chrysolepis*, *Quercus vaccinifolia*, *Amelanchier utahensis*, *Arctostaphylos viscida* ssp. *mariposa* (= *Arctostaphylos mariposa*), *Ceanothus prostratus*, *Garrya fremontii*, *Philadelphus lewisii*, and *Symphoricarpos mollis*. Most of the tree species in this association have a dbh between four–11 inches, and some of the tree species have a dbh of 12–23 inches. This association is found at low to midelevations (4,600–7,100 feet) on west- and south-facing slopes primarily less than 35 percent. Soil textures are usually loams and are commonly from granitic and sometimes andesitic parent material (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus kelloggii*/*Arctostaphylos patula* Forest form a three-story structure with approximately 10–15 percent cover at 5–10 meters tall, 5 percent cover at 2–5 meters tall, 40 percent cover at 0.5–1 meter tall, and 5 percent cover at 0–0.5 meter tall. This association is dominated by *Quercus kelloggii* in the open tree layer with an intermittent understory shrub layer of *Arctostaphylos patula* and *Ceanothus cordulatus*. *Calocedrus decurrens* may also be quite common in this association. *Chrysolepis sempervirens* is sometimes common. Other species that may contribute to minor cover vary but may include *Chamaebatia foliolosa*, *Rosa spithamea*, *Abies concolor*, *Aspidotis californica*, *Cistanthe monosperma*, *Claytonia perfoliata*, *Collinsia linearis*, *Comandra umbellata*, *Galium aparine*, *Hydrophyllum occidentale*, *Linanthus ciliatus*, *Lithophragma parviflorum*, *Madia minima*, and *Penstemon newberryi*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Stands are likely to be seral and transcend to other vegetation types depending on fire frequency. The average acreage and density of stands throughout the range of this type is probably relatively low in many areas (where natural fire has been suppressed) compared to pre-European fire history over the past several hundred years.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Locally sampled stands appear to be recent post-fire, with relatively open canopies and regenerating (resprouting) subcanopies of black oak and other species. It is likely that this association occurs in relatively poor soils of the upper

elevation zone for black oak and is maintained by relatively frequent burning that eliminates the dominance of conifers. Formally, according to NVCS standards, the stands should mostly be considered woodlands rather than forests. However, in lieu of defining a new woodland *Quercus kelloggii* alliance we have elected to maintain this association within the already established Black Oak alliance.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K39

NRI: 150

Wieslander: **181**

***Quercus kelloggii* - *Calocedrus decurrens* Forest [Provisional]**

COMMON NAME	Black Oak - Incense Cedar Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest
PHYSIOGNOMIC GROUP	Mixed broad-leaved evergreen - cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Mixed broad-leaved evergreen - cold deciduous forest
ALLIANCE	<i>Quercus kelloggii</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association ranges throughout the Sierra Nevada.

Yosemite and environs

Stands of *Quercus kelloggii* - *Calocedrus decurrens* Forest are sampled in the mapping area of Yosemite and environs within the Yosemite, Lake Eleanor, and Hetch Hetchy Reservoir 15-minute topographic quadrangle and the Lake Eleanor, Cherry Lake South, and Buckingham Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus kelloggii* - *Calocedrus decurrens* Forest are found at dry mesic to mesic sites at low to midelevations (3,900–5,400 feet) on the mid portion of south- to north-facing, moderate to somewhat steep (12–23 degrees) slopes. Soils are moderately developed to stony and tend to be moderately well drained to well drained with textures ranging from loam to silt loam of igneous, metamorphic, and granitic parent material. Litter cover is high (80–95% cover). Disturbance is usually low.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Quercus kelloggii</i>
Shrub	<i>Chamaebatia foliolosa</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus kelloggii*, *Calocedrus decurrens*
Shrub *Chamaebatia foliolosa*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus kelloggii* - *Calocedrus decurrens* Forest form an intermittent tree layer with 5 percent cover at 20–35 meters tall, 40–60 percent cover at 10–15 meters tall, 5 percent cover at 5–10 meters tall, and an intermittent to continuous shrub layer with 20 percent cover at 2–5 meters tall and 20–70 percent cover at 0–0.5 meters tall. The herb layer is sparse with 5–10 percent cover at 0–0.5 meters tall. This association is dominated by *Quercus kelloggii* and *Calocedrus decurrens* in the overstory and *Chamaebatia foliolosa* in the understory. Rarely are *Abies concolor*, *Pinus ponderosa*, *Pseudotsuga menziesii*, and *Quercus chrysolepis* present. A variety of other species may be present contributing to minor cover including *Arctostaphylos patula*, *Toxicodendron diversilobum*, *Ceanothus integerrimus*, *Arctostaphylos mewukka*, *Galium bolanderi*, and *Galium aparine*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

It is likely that this is a mesic version of the Black oak alliance, which is being invaded by the shade-tolerant and relatively mesophytic *Calocedrus decurrens*. It likely results from a post-fire recovery in relatively productive settings.

Plots used to describe association (n=9)

USGS–NPS Veg Data: 99S29, 99S36, 98M20
NRI: 10, 149, 265, 41, 25, 70

Alnus rhombifolia Forest

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

PHYSIOGNOMIC SUBGROUP

FORMATION

White Alder Forest

None

Forest

Deciduous forest

Cold deciduous forest

Natural/Seminatural

Temporarily flooded cold deciduous forest

ALLIANCE

Alnus rhombifolia Temporarily Flooded Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM
RANGE

Wetland: Riverine, Palustrine, and Estuarine

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Don Potter (pers com 2002) has about 71 plots resembling this association collected from the Moculumne River to Lake Isabella but has not described them. Potter suggests that this association ranges throughout the western slope of the Sierra Nevada.

Yosemite and environs

Stands of *Alnus rhombifolia* Forest were sampled within the Wawona, Cherry Lake South, and El Capitan 7.5 minute topographic quadrangles. Potter also has one plot for this association, located at the west-central portion of Yosemite near Mather.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Potter (2000 MS) describes an *Alnus rhombifolia*/*Darmera peltata* association that is largely found north of the mapping area. This association is similar to the one currently described locally, without the constant characteristic species *Darmera peltata*.

Yosemite and environs

Stands of *Alnus rhombifolia* Forest are found at low to midelevations (4,400–5,000 feet) on concave, hummocky and undulating, southeast- to north-facing, flat to moderately steep (0–20%) slopes. These sites tend to be along drainages, floodplains, or streambeds that are intermittently flooded to permanently flooded. In general, *Alnus rhombifolia* stands require permanent moisture, whether subterranean or on the surface. Along intermittent streams, the stands are associated most regularly with deeper pools or stretches of more permanently flooded substrate. Soils are generally stony (10–40% large rocks, 1–15% small rocks, 1–10% sand) with textures ranging from sand to sandy loam and of granitic parent material. Soil is somewhat poorly to rapidly draining. Litter cover is 18–50 percent and water cover is 1–20 percent. Wood cover is 12–20 percent. Disturbance other than fluvial processes is low to medium.

MOST ABUNDANT SPECIES

Globally

This association is only described from Yosemite. However, Potter (pers com 2002) suggests that *Alnus rhombifolia* is the most abundant tree with *Darmera peltata* and several *Carex* species as the most conspicuous (if not abundant) herbs.

Yosemite and environs

Tree	<i>Alnus rhombifolia</i>
Shrub	<i>Cornus nuttallii</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Alnus rhombifolia*, *Abies concolor*, *Calocedrus decurrens*
Shrub *Cornus nuttallii*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Alnus rhombifolia* Forest are found forming an intermittent to continuous canopy with 5–50 percent cover at 20–35 meters tall, 5–70 percent cover at 10–15 meters tall, 0–10 percent cover at 5–10 meters tall, and 10–80 percent cover at 2–5 meters tall. The shrub layer is open to continuous with 0–10 percent cover at 2–5 meters tall, 5–10 percent cover at 1–2 meters tall, and 5–80 percent cover at 0.5–1 meter tall. The herb layer is open with up to 40 percent cover at 0–0.5 meters tall. This association is dominated by *Alnus rhombifolia* in narrow bands often associated with perennial steams. *Calocedrus decurrens* is often an important codominant tree. *Cornus nuttallii* and *Abies concolor* are usually present. Other species that may be found in this association include *Adenocaulon bicolor*, *Rubus parviflorus*, *Claytonia perfoliata* (= *Montia perfoliata*), *Galium aparine*, *Pteridium aquilinum*, *Athyrium filix-femina*, and *Boykinia major*. *Dryopteris arguta* may be common at some sites. *Carex tompkinsii* is a rare species that may be found in this association. Anecdotal information suggests that the shrubs *Corylus cornata*, *Rhododendron occidentale*, *Rubus parviflora*, and *Cornus stolonifera* may also be conspicuous in some stands.

OTHER NOTEWORTHY SPECIES

Carex tompkinsii is a List 4 species (CNPS 2001) found at one of the 32 plots. It usually is found in chaparral, cismontane woodland, lower montane coniferous forests, and upper montane coniferous forest at 1,400–6,000 feet. This plant is found within Fresno, Mariposa, and Tuolumne counties.

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

As a result of sampling strategy and of the dynamic nature of this vegetation, estimates of tree cover vary widely. This association is modally considered a forest type because the most extensive stands, associated with stretches of streams that are moderately to lightly disturbed by natural flooding events, maintain a relatively dense canopy of trees. *Darmera peltata* is rare south of the central Sierra Nevada; thus, this association is probably the southern and central Sierran analog to that Potter (2000) type.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 98M37, 99K28, 99K40, 98M30
Potter: 661, 331

***Populus balsamifera*/Rhododendron occidentale Forest [Provisional]**

COMMON NAME	Balsam Poplar/Western Azalea Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest

PHYSIOGNOMIC GROUP Cold deciduous forest
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Temporarily flooded cold deciduous forest

ALLIANCE *Populus balsamifera* ssp. *trichocarpa* Temporarily Flooded Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine
RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. Don Potter (pers comm. 2002) has 10 samples of *Populus balsamifera*-dominated stands from the central and southern Sierra Nevada.

Yosemite and environs

This association is only known from the Yosemite Valley.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association was found at approximately 4,000 feet elevation on valley floors adjacent to perennial streams. Slopes are gentle with a southerly aspect. Soils are permanently flooded and are sandy loams derived from granite.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Populus balsamifera* ssp. *trichocarpa*
Shrub *Rhododendron occidentale*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Populus balsamifera* ssp. *trichocarpa*
Shrub *Rhododendron occidentale*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This forest forms an open canopy between 20–35 meters in height. *Populus balsamifera* ssp. *trichocarpa* dominates the canopy with 26 percent cover, while *Alnus rhombifolia* contributes another 15 percent cover to the canopy or subcanopy. Emergent coniferous species such as *Calocedrus decurrens* or *Pinus ponderosa* may contribute scant cover. *Rhododendron occidentale* is the most common shrub (2.5% cover). Other common shrub associates may include *Salix lutea* (1.25% cover) and/or *Artemisia douglasiana* (0.5% cover). Many graminoids are present. *Calamagrostis canadensis* provides the most cover (18.75%), but the genus *Carex* has many representatives that combine for a few percent of cover. Species may include *Carex pellita*, *Carex feta*, *Carex lenticularis*, *Carex amplifolia*, and/or *Carex vesicaria*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Don Potter (pers comm. 2002) has not classified the 10 plots he has collected that are dominated or codominated by *P. balsamifera*, and is uncertain how they will relate to other riparian vegetation types. He suggests they are closely related to some *Alnus rhombifolia* alliance stands of the west side of the Sierra Nevada.

Yosemite and environs

More stands of this vegetation need to be sampled. However, it is distinct in Yosemite Valley.

Plots used to describe association (n=2)

USGS–NPS Veg Data: 99S49, 99K49

Pinus attenuata/Arctostaphylos viscida Woodland [Provisional]

COMMON NAME	Knobcone Pine/Whiteleaf Manzanita Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen Woodland
ALLIANCE	<i>Pinus attenuata</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL 2	
USFWS WETLAND SYSTEM	Upland
RANGE	

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Don Potter (pers com 2002) has sampled this association elsewhere in the central Sierra Nevada.

Yosemite and environs

Stands of *Pinus attenuata*/*Arctostaphylos viscida* Woodland are found throughout the western lower elevation portions of the mapping area of Yosemite and environs. Samples have been taken within the Kinsley, Buckingham Mountain, and El Portal 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus attenuata*/*Arctostaphylos viscida* Woodland are found at xeric to dry mesic sites at low elevations (2,900–900 feet) on the upper slopes and ridge tops of variable but mostly southeast- to west-facing, gentle to somewhat steep slopes. The shapes of slopes are highly variable. Soils are moderately developed to well developed with textures ranging from silt loam to clay loam from metamorphic and granitic parent materials. Soils are moderately well drained to well drained. Litter cover is 70–80 percent. Disturbance levels can be low to high and include competition from exotics, road/trail construction, and vandalism/litter. Fire is also a common disturbance.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus attenuata</i>
Shrub	<i>Arctostaphylos viscida</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus attenuata</i>
Shrub	<i>Arctostaphylos viscida</i>

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus attenuata*/*Arctostaphylos viscida* Woodland are structured as follows: 5 percent cover at 0–0.5 meter tall, 0–5 percent cover at 0.5–1 meter tall, 20–80 percent cover at 1–2 meters tall, 40–80 percent cover at 2–5 meters tall,

5–20 percent cover at 5–10 meters tall, 20–30 percent cover at 10–15 meters tall, and 0–10 percent cover at 15–20 meters tall. This association is dominated by an open layer of *Pinus attenuata* in the overstory with an often dense understory shrub layer dominated by *Arctostaphylos viscida*. Often found in the shrub layer are *Adenostoma fasciculatum* and *Chamaebatia foliolosa*. Where *Arctostaphylos viscida* is more open, *Chamaebatia foliolosa* often becomes an extensive ground cover. Occasionally, present are *Pinus ponderosa*, *Quercus kelloggii*, *Vulpia myuros*, and *Arctostaphylos mewukka*. Other species that may contribute to cover include *Quercus douglasii*, *Toxicodendron diversilobum*, *Ceanothus cuneatus*, *Dichelostemma capitatum*, *Sanicula bipinnata*, and *Filago* sp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

RANK JUSTIFICATION Likely to be scattered throughout the western Sierra Nevada and Klamath Province but not extensive. Conditions for ultimate development are strongly dependent upon fire regime.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Locally the ridge top locations for this association suggest relatively intense fires of moderate frequency are necessary for its maintenance. More samples are needed to verify this association.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99S10, 99S32, 98M6

Pinus ponderosa - *Quercus kelloggii*/*Arctostaphylos viscida* Woodland [Provisional]

COMMON NAME	Ponderosa Pine - Black Oak/Whiteleaf Manzanita Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland
ALLIANCE	<i>Pinus ponderosa</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Don Potter (Pers com., 2002, unpublished data) has about 10 plots with no descriptions.

Yosemite and environs

Stands of *Pinus ponderosa* - *Quercus kelloggii*/*Arctostaphylos viscida* Woodland are found at low elevations on the west slope and have been sampled within the Lake Eleanor 7.5-minute topographic quadrangle.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Quercus kelloggii*/*Arctostaphylos viscida* Woodland are found at relatively xeric sites at low elevations (1,700–4,500 feet) on the low to high portions of mostly south- to southwest-facing (and occasionally northeast-facing at the lowest elevations), gentle to moderately steep (7–16 percent degrees), mostly linear mountain slopes. Soils are poorly developed and fairly stony with textures ranging from sandy loam to clay loam from metamorphic and granitic parent materials. Soils are somewhat poorly drained to well drained. Litter is high with 75–95 percent cover.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus ponderosa</i>
Shrub	<i>Arctostaphylos viscida</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus ponderosa</i> , <i>Quercus kelloggii</i>
Shrub	<i>Arctostaphylos viscida</i>

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus ponderosa* - *Quercus kelloggii*/*Arctostaphylos viscida* Woodland have approximately 5 percent cover at 0–0.5 meter tall, 30 percent cover at 0.5–1 meters tall (herbs), 5 percent cover at 0.5–1 meters tall (shrubs), 50–70 percent cover at 1–2 meters tall, 20 percent cover at 2–5 meters tall, 40 percent cover at 2–5 meters tall (trees), 10 percent cover at 5–10 meters tall, and 10–40 percent cover at 20–35 meters tall. This association is dominated by *Pinus ponderosa* in the open to intermittent overstory tree layer and *Arctostaphylos viscida* in the open to continuous understory shrub layer. Often present in the overstory are *Pinus lambertiana* and *Quercus kelloggii*. *Pinus attenuata* and *Quercus wislizeni* may occasionally be found contributing minor cover. Often in the shrub layer is *Toxicodendron diversilobum*. *Bromus diandrus*, *Galium parisiense*, *Hypochaeris glabra*, and *Vulpia myuros* are common. *Quercus kelloggii* in either seedling, sapling (shrubby), or tree form is a constant, although at usually relatively low cover. A variety of other species may also be found contributing minor cover including *Comandra umbellata* ssp. *californica*, *Bromus hordeaceus*, *Chamaebatia foliolosa*, *Clarkia purpurea*, *Eriogonum nudum*, *Lessingia leptoclada*, *Lotus unifoliolatus* var. *unifoliolatus*, *Streptanthus tortuosus*, *Stephanomeria virgata*, and *Trifolium wormskioldii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This association is likely to occur throughout the Sierra Nevada and perhaps elsewhere in northern California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is the first expression of Zone II to occur in the study area. It usually is first encountered on north-facing slopes below 2,000 feet elevation in relatively mesic conditions adjacent to stands of *Quercus wislizeni* alliance or various chaparrals.

Plots used to describe association (n=5)

USGS-NPS Veg Data: 98M10, 98M9, 99K20

NRI: 318

Wieslander: 681

***Pinus sabiniana* - *Quercus wislizeni*/Ceanothus cuneatus Woodland [Provisional]**

COMMON NAME	Foothill Pine - Interior Live Oak/Wedgeleaf Buckbrush Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus sabiniana* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. This association is likely to occur elsewhere in the foothill belt of the Sierra Nevada.

Yosemite and environs

Stands of *Pinus sabiniana* - *Quercus wislizeni*/Ceanothus cuneatus Woodland are found at low elevations within the mapping area of Yosemite and environs and were sampled within the El Portal and Kinsley 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus sabiniana* - *Quercus wislizeni*/*Ceanothus cuneatus* Woodland are found at xeric sites at low elevations (1,400–2,200 feet) on the low to mid portions of south- to southwest- and sometimes northeast-facing, steep to somewhat steep slopes. Soils tend to be stony, moderately well developed with textures that range from sandy loam to clay loam. Parent materials include granite, diorite, slate, phyllite, igneous, and metamorphic rock. Soils are well drained to rapidly draining. Fire tends to be fairly common. Disturbance from exotics ranges from low to high.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus sabiniana*, *Quercus wislizeni*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus sabiniana*, *Quercus wislizeni*
Shrub *Ceanothus cuneatus*, *Toxicodendron diversilobum*
Herbaceous *Vulpia myuros*, *Bromus diandrus*, *Hypochaeris glabra*, *Avena barbata*, *Melica californica*,
 Pentagramma triangularis

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus sabiniana* - *Quercus wislizeni*/*Ceanothus cuneatus* Woodland consist of 5–70 percent cover at 0–0.5 meter tall, 5 percent cover at 0.5–1 meter tall, 20–30 percent cover at 1–2 meters tall, 5–10 percent cover at 2–5 meters tall, 5–40 percent cover at 5–10 meters tall, 10–60 percent cover at 10–15 meters tall, and 10–30 percent cover at 20–35 meters tall. This association has an intermittent tree layer dominated by *Pinus sabiniana* and *Quercus wislizeni* and an open understory shrub layer dominated by *Ceanothus cuneatus*. Also found in this association contributing to less cover are *Toxicodendron diversilobum*, *Vulpia myuros*, *Bromus diandrus*, *Hypochaeris glabra*, *Avena barbata*, *Melica californica*, and *Pentagramma triangularis*. Other species contributing to minor amounts of cover may include *Arctostaphylos viscida*, *Aira caryophyllea*, *Symphoricarpos mollis*, *Trifolium microcephalum*, *Pellaea mucronata*, *Bromus tectorum*, *Bromus arenarius*, and *Selaginella hansenii*. *Eriophyllum congdonii* is a rare species that may be found contributing to very little cover in this association.

OTHER NOTEWORTHY SPECIES

Eriophyllum congdonii is a List 1B species found in one of the four plots. This species occurs in Mariposa County and is usually found in chaparral, cismontane woodland, and lower montane coniferous forests on stony metamorphic sites at elevations of 1,600–6,200 feet. It is threatened by nonnative species (CNPS 2001).

CONSERVATION RANK G3?

RANK JUSTIFICATION This association was not defined from the statewide work of Allen et al. (1991), thus it is assumed that it is relatively restricted to the central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type occurs relatively commonly on steep southerly exposures of the lower Merced River canyon.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98K8, 99K43, 99K8, 99S5

Pinus sabiniana - *Quercus wislizeni*/*Arctostaphylos viscida* Woodland [Provisional]

COMMON NAME	Foothill Pine - Interior Live Oak/Whiteleaf Manzanita Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus sabiniana* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus sabiniana* - *Quercus wislizeni*/*Arctostaphylos viscida* Woodland are sampled in the mapping area of Yosemite and environs within the Hetch Hetchy Reservoir, El Portal 7.5-minute, and Lake Eleanor 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus sabiniana* - *Quercus wislizeni*/*Arctostaphylos viscida* Woodland are found at xeric sites at low elevations (1,800–4,500 feet) on the low to upper portions of southwest- to north-facing slopes at higher elevations. Slopes are linear, convex, and concave shaped and vary from gentle to steep. Soils tend to be poorly developed and stony in places with textures ranging from loamy sand to clay loam and of metamorphic, igneous, and granitic parent materials. Litter ranges from 60–75 percent cover. Fire is common and can cover extensive areas. Impact from the invasion of exotic species can be high.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Arctostaphylos viscida*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus sabiniana*, *Quercus wislizeni*
Shrub *Arctostaphylos viscida*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus sabiniana* - *Quercus wislizeni*/*Arctostaphylos viscida* Woodland are found with 20–60 percent cover at 5–10 meters tall, 20 percent cover at 2–5 meters tall, 20–40 percent cover at 1–2 meters tall, 10–20 percent cover at 0.5–1 meters tall, and 5–20 percent cover at 0–0.5 meters tall. This association forms an open to intermittent tree layer dominated by *Pinus sabiniana* and *Quercus wislizeni* with an intermittent understory shrub layer dominated by *Arctostaphylos viscida*. Other species contributing to minor cover varies and may include *Toxicodendron diversilobum*, *Aira caryophyllea*, *Bromus hordeaceus*, *Bromus diandrus*, *Cercis canadensis* var. *texensis*, *Eriodictyon californicum*, lichen, moss, *Rhamnus ilicifolia* (= *Rhamnus crocea* ssp. *ilicifolia*), *Rhus trilobata*, *Cheilanthes gracillima*, and *Ceanothus cuneatus*. *Ceanothus fresnensis* is a rare species that may occur within this association. The stands are usually relatively open but variable, and they may range from a woodland condition to a sparsely wooded herbaceous or shrubland condition as defined by the NVCS standards.

OTHER NOTEWORTHY SPECIES

Ceanothus fresnensis is a List 4 species found in one of the four plots. This species occurs in Calaveras, Fresno, Madera, Mariposa, Tulare, and Tuolumne counties and is usually found in cismontane woodland and lower montane coniferous forests at elevations of 2,900–6,500 feet (CNPS 2001).

CONSERVATION RANK G3?

RANK JUSTIFICATION This association was not defined from the statewide work of Allen et al., (1991), thus it is assumed that it is relatively restricted to the central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

These stands are typically open on steep stony soils with poorer development than typically occurs with the associations that contain *Quercus douglasii*. It appears that *Quercus douglasii* requires deeper, perhaps more argillic, soil than *Quercus wislizeni*.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99S16, 99K41

NRI: 54, 55

***Quercus wislizeni* - *Quercus chrysolepis* Woodland [Provisional]**

COMMON NAME	Interior Live Oak - Canyon Live Oak Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Extremely xeromorphic evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Sclerophyllous extremely xeromorphic evergreen woodland

ALLIANCE *Quercus wislizeni* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus wislizeni* - *Quercus chrysolepis* Woodland are found at lower elevations on the west slope in mapping area of Yosemite and environs and were sampled within the Kinsley and El Portal 7.5-minute topographic quadrangles. It is seen in the more significant ravines north of the Merced River and also as stands in the Hetch Hetchy region where canyon live oak will tend to favor the lower, moister portions of canyons and draws.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus wislizeni* - *Quercus chrysolepis* Woodland are found at dry mesic sites at low elevations (1,900–2,600 feet) on the low to mid portions of generally southwest-facing (at its lower elevation limits it can occur on drier

north-facing aspects), moderately steep to steep slopes. Soils are poorly develop and tend to be well drained sandy loam and from metamorphic, igneous, and granitic parent materials. Invasion from exotic species is high at this association. Litter cover is 25–40 percent. Fire is uncommon in these stands.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus wislizeni*, *Quercus chrysolepis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus wislizeni*, *Quercus chrysolepis*
Shrub *Toxicodendron diversilobum*
Herbaceous *Avena barbata*, *Pellaea andromedifolia*, *Vulpia myuros*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus wislizeni* - *Quercus chrysolepis* Woodland are found with approximately 5 percent cover at 20–30 meters tall, 40 percent cover at 10–15 meters tall, 5–10 percent cover at 2–5 meters tall, 5–10 percent cover at 1–2 meters tall, 40 percent cover at 0.5–1 meter tall, and 60 percent cover at 0–0.5 meter tall. This association forms an open to intermittent tree layer dominated by *Quercus wislizeni* and *Quercus chrysolepis*. *Toxicodendron diversilobum* is usually present in the shrub layer. Found in the herb layer are *Avena barbata*, *Pellaea andromedifolia*, and *Vulpia myuros*. A variety of other species may contribute to minor cover and often include *Bromus diandrus*, *Trifolium microcephalum*, *Galium parisiense*, *Hypochaeris glabra*, *Claytonia perfoliata*, *Eschscholzia caespitosa*, *Pentagramma triangularis*, *Aesculus californica*, *Artemisia douglasiana*, *Bromus rubens*, *Bromus tectorum*, *Clarkia unguiculata*, and *Melica imperfecta*. *Eriophyllum congdonii* and *Carex tompkinsii* are rare species that may occur within this association.

OTHER NOTEWORTHY SPECIES

Eriophyllum congdonii is a List 1B species found in one of the three plots. This species occurs in Mariposa County and is usually found in chaparral, cismontane woodland, and lower montane coniferous forests on stony metamorphic sites at elevations of 1,600–6,200 feet. It is threatened by nonnative species (CNPS 2001).

Carex tompkinsii is a List 4 species found at one of the three plots. It usually is found at chaparral, cismontane woodland, lower montane coniferous forests, and upper montane coniferous forest at 1,400–6,000 feet. This plant is found within Fresno, Mariposa, and Tuolumne counties (CNPS 2001).

CONSERVATION RANK G3

RANK JUSTIFICATION Relatively limited in acreage by topographic setting (ravine bottoms) and by narrow zone of overlap of the two characteristic tree species.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Depending upon the delineation of the sampling plots, this association would be considered a riparian to semiriparian type. True riparian species such as *Calycanthus occidentalis* may be considered to occur in the stands if the central intermittent channels of the ravines are not excluded from the sample plots.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99S8, 98M1

Potter: 1238

Quercus wislizeni - *Arctostaphylos viscida* Woodland [Provisional]

COMMON NAME Interior Live Oak - Whiteleaf Manzanita Woodland

SYNONYM None

PHYSIOGNOMIC CLASS Woodland

PHYSIOGNOMIC SUBCLASS Evergreen woodland

PHYSIOGNOMIC GROUP Natural/Seminatural

PHYSIOGNOMIC SUBGROUP Extremely xeromorphic evergreen woodland

FORMATION Sclerophyllous extremely xeromorphic evergreen woodland

ALLIANCE *Quercus wislizeni* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found in the Sierra Nevada and foothill regions from Yuba to Madera counties and in Shasta County (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus wislizeni* - *Arctostaphylos viscida* Woodland are sampled in the mapping area of Yosemite and environs within the Cherry Lake South 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Quercus wislizeni* - *Arctostaphylos viscida* Woodland are found at low elevations (600–4,250 feet) on all aspects of slopes that are primarily less than 45 percent. Soil textures range from gravelly sands to clayey loams from granitic, metamorphic and some sedimentary parent materials (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus wislizeni* - *Arctostaphylos viscida* Woodland are found at low elevations (3,400–3,800 feet) on steep, south- to southwest-facing slopes. Soils are moderately deep, poorly drained to rapidly drained, with textures ranging from stony loam to loamy sand of granitic material.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Quercus wislizeni</i>
Shrub	<i>Arctostaphylos viscida</i> , <i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

Yosemite and environs

Tree	<i>Quercus wislizeni</i>
Shrub	<i>Arctostaphylos viscida</i> , <i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Quercus wislizeni</i> , <i>Pinus sabiniana</i>
Shrub	<i>Arctostaphylos viscida</i> , <i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

Yosemite and environs

Tree	<i>Quercus wislizeni</i>
Shrub	<i>Arctostaphylos viscida</i>

VEGETATION DESCRIPTION

Globally

Stands of *Quercus wislizeni* - *Arctostaphylos viscida* Woodland are dominated by *Quercus wislizeni*, *Arctostaphylos viscida*, and *Ceanothus cuneatus* with an understory of grasses. *Quercus kelloggii* and *Quercus douglasii* may also be found in this association but are of low cover. Shrubs that may be found here include *Heteromeles arbutifolia*, *Toxicodendron diversilobum*, and *Rhamnus crocea*. Rarely occurring are *Aesculus californica*, *Calocedrus decurrens*, *Pinus ponderosa*, *Pseudotsuga menziesii*, *Quercus chrysolepis*, *Quercus lobata*, *Quercus durata*, *Quercus x morehus*, *Corylus cornuta*, *Fremontodendron californicum* (= *Fremontia californica*), *Pinus sabiniana*, *Adenostoma fasciculatum*, *Arctostaphylos manzanita*, *Arctostaphylos viscida* ssp. *mariposa* (= *Arctostaphylos mariposa*), *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), *Ceanothus integerrimus*, *Chamaebatia foliolosa*, *Diplacus aurantiacus* (= *Mimulus aurantiacus*), *Eriodictyon californicum*, *Garrya veatchii*, *Lonicera subspicata*, *Prunus subcordata*, *Frangula californica* (= *Rhamnus californica*), *Rhus trilobata*, *Ribes californicum*, *Ribes roezlii*, *Rosa californica*, *Sambucus caerulea*, *Symphoricarpos albus* var. *laevigatus* (= *Symphoricarpos rivularis*), *Apocynum cannabinum*, *Triteleia laxa* (= *Brodiaea laxa*), *Erodium cicutarium*, *Ericameria arborescens* (= *Haplopappus arborescens*), and *Lupinus albifrons*. Most of the tree species in this association have a dbh between 4–11 inches, and some of the tree species have a dbh of 12–23 inches (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus wislizeni* - *Arctostaphylos viscida* Woodland are dominated by *Quercus wislizeni* in the tree and shrub layers and *Arctostaphylos viscida* in the shrub layer with an understory of herbs and grasses. *Quercus chrysolepis*, *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), *Ceanothus cuneatus*, *Adenostoma fasciculatum*, and *Toxicodendron diversilobum* can be common at these sites. Other species present may include *Bromus diandrus*, *Bromus laevipes*, *Eriophyllum lanatum*, *Galium bolanderi*, *Lupinus albifrons*, *Lupinus benthamii*, *Pellaea mucronata*, *Phacelia mutabilis*, *Pinus sabiniana*, *Poa secunda*, *Pseudognaphalium canescens*, *Rhamnus ilicifolia* (= *Rhamnus crocea* ssp. *ilicifolia*), *Symphoricarpos mollis*, and *Umbellularia californica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Stands apparently occur throughout the foothill zones of California north of the Transverse Ranges. However, stand quality in many areas may be compromised by invasive exotics and development.

DATABASE CODE To be determined

COMMENTS

Globally

There is good correspondence between the vegetation description by Allen of *Q. wislizeni*-*Q. douglasii*-*P. sabiniana* Woodland Association throughout its range and the subset of species found locally in the Yosemite mapping area. Overstory species are the same though the cover is lower at Yosemite for *Quercus douglasii* and *Pinus sabiniana*. Yosemite has *Toxicodendron* as one of the understory species; globally, poison oak may occur along with *Ceanothus cuneatus*, *Ribes*, or *Arctostaphylos* sp.

Yosemite and environs

Currently there is an uncertain relationship between this association and *Pinus sabiniana* - *Quercus wislizeni*/*Arctostaphylos viscida* Woodland. In general, the only substantive distinction is that this association has usually less than 10 percent *Pinus sabiniana*. Definitions become problematic at the low levels of total vegetation cover where total tree cover is less than 20 percent. To separate the *Pinus sabiniana* from the *Quercus wislizeni* alliance, the current definition requires that a stand must have greater than 60 percent relative cover of the nominal species in the tree layer to be a member of that alliance.

Plots used to describe association (n=2)

USGS-NPS Veg Data: 99K24

Wieslander: **416**

***Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana*/Bromus sp-Daucus pusillus Woodland**

COMMON NAME	Interior Live Oak - Blue Oak - Foothill Pine Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Natural/Seminatural
PHYSIOGNOMIC SUBGROUP	Extremely xeromorphic evergreen woodland
FORMATION	Sclerophyllous extremely xeromorphic evergreen woodland
ALLIANCE	<i>Quercus wislizeni</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association occurs in the Sierra Nevada from Butte County to Kern County and in San Benito County (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana* Woodland are sampled in the mapping area of Yosemite and environs within the El Portal 7.5 minute topographic quadrangle.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana* Woodland are found at low elevations (400–5,000 feet) on north- to northeast- and south- to southwest-facing slopes that are primarily less than 25 percent. Soil textures are loam to stony clay loam and sand loams. Parent materials are mostly granitic or mixed and occasionally mafic or metamorphic (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana* Woodland are found at low elevations (1,600–2,200 feet) on the low to mid portion of south- to southwest-facing steep slopes. Soils are poorly drained to well drained with textures ranging from silt loam to clay loam. Parent materials are metamorphic and schist. Disturbance from invasion of exotics is common with impact levels of low to high. Vandalism, dumping, and litter may also have a low impact.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Quercus wislizeni</i> , <i>Quercus douglasii</i> , <i>Pinus sabiniana</i>
Herbaceous	<i>Poaceae</i>

Yosemite and environs

Tree	<i>Quercus wislizeni</i>
Herbaceous	<i>Poaceae</i> , <i>Hypochaeris glabra</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Quercus wislizeni</i> , <i>Quercus douglasii</i> , <i>Pinus sabiniana</i>
Herbaceous	<i>Poaceae</i>

Yosemite and environs

Tree	<i>Quercus wislizeni</i> , <i>Quercus douglasii</i> , <i>Pinus sabiniana</i>
Shrub	<i>Toxicodendron diversilobum</i>
Herbaceous	<i>Poaceae</i> , <i>Hypochaeris glabra</i> , <i>Galium parisiense</i> , <i>Daucus pusillus</i> , <i>Clarkia purpurea</i> , <i>Torilis arvensis</i> , <i>Castilleja densiflora</i>

VEGETATION DESCRIPTION

Globally

Stands of *Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana* Woodland are dominated by *Quercus wislizeni*, *Quercus douglasii*, and *Pinus sabiniana* with an understory of grasses. Shrubs that may be found here include *Ceanothus cuneatus*, *Toxicodendron diversilobum*, *Ribes californicum*, and *Arctostaphylos viscida*. Rarely occurring are *Aesculus californica*, *Quercus chrysolepis*, *Quercus kelloggii*, *Quercus garryana*, *Pinus jeffreyi*, *Amelanchier utahensis*, *Arctostaphylos manzanita*, *Arctostaphylos viscida* ssp. *mariposa* (= *Arctostaphylos mariposa*), *Artemisia tridentata*, *Ceanothus leucodermis*, *Ceanothus spinosus*, *Eriodictyon californicum*, *Eriogonum fasciculatum*, *Ericameria linearifolia* (= *Haplopappus linearifolius*), *Heteromeles arbutifolia*, *Juniperus californica*, *Lonicera subspicata*, *Prunus ilicifolia*, *Prunus virginiana*, *Frangula californica* (= *Rhamnus californica*), *Rhamnus crocea*, *Ribes*, sp. and *Salix* sp. Most of the tree species in this association have a dbh between 4–11 inches, and some of the tree species have a dbh of 12–23 inches (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana* Woodland consist of 0–70 percent cover at 0–0.5 meter tall, 5 percent cover at 0.5–1 meter tall, 5–40 percent cover at 1–2 meters tall, 0–20 percent cover at 2–5 meters tall, 20 percent cover at 5–10 meters tall, 5–40 percent cover at 10–15 meters tall, and 5 percent cover at

20–35 meters tall. This association is dominated by *Quercus wislizeni* in the overstory. *Pinus sabiniana* and *Quercus douglasii* are less abundant but also important in the overstory. *Hypochaeris glabra*, *Galium parisiense*, *Daucus pusillus*, and a variety of grasses and herbs are found in the understory. Understory species often found at this association include *Bromus diandrus*, *Clarkia purpurea*, *Torilis arvensis*, *Toxicodendron diversilobum*, and *Castilleja densiflora*. Occasionally, *Bromus hordeaceus*, *Triteleia ixioides*, *Avena fatua*, and *Lupinus benthamii* are common. *Bromus arenarius*, *Cercis canadensis* var. *texensis*, *Ceanothus cuneatus*, *Medicago polymorpha*, *Poa secunda*, *Rhamnus ilicifolia* (= *Rhamnus crocea* ssp. *ilicifolia*), *Sanicula bipinnatifida*, and *Vulpia myuros* are occasionally found contributing minor cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to occur throughout much of the foothill belt of cismontane California, but threatened to some degree by invasive exotics, development, and by higher than modal grazing pressure.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association locally (n=2)

USGS–NPS Veg Data: 99K1, 98K1

***Cercocarpus montanus* var. *glaber* (C. betuloides, Hickman 1993) Woodland**

COMMON NAME	Birch-Leaf Mountain-Mahogany Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Sclerophyllous evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Giant temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Cercocarpus montanus</i> var. <i>glaber</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland
RANGE	

Globally

This woodland association is only known from Yosemite. However, a similar if not identical association is being defined for the western foothills of Sequoia and Kings Canyon national parks. It is likely that it occurs elsewhere in the Sierra Nevada.

Yosemite and environs

This association is relatively uncommon in Yosemite and environs. The stands occur within the Merced River and the Tuolumne River drainages in ecological Zones I and II.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of the association is not available without additional inventory.

Yosemite and environs

This association is found in high slope positions on generally well drained loam and sandy loam soils derived from granite and metamorphics. Elevations range from 2,980–5,100 feet, and aspects are typically northerly at low elevations and westerly to southwesterly at higher elevations. Litter/Duff cover averages 35 percent. Sites are upland and tend to have between 10–40 percent large rock or bedrock cover.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs to date. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Cercocarpus montanus* var. *glaber*

Shrub *Cercocarpus montanus* var. *glaber*

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Cercocarpus montanus* var. *glaber*

Shrub *Cercocarpus montanus* var. *glaber*

VEGETATION DESCRIPTION

Globally

This association is only described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

It is debatable whether this should be considered a shrub or tree association. Although the average height for the dominant and characteristic species is around 4–5 meters, the morphology is typically multitemmed and scraggly. The short tree layer between 2–5 meters averages 44 percent cover and is composed of *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides* var. *betuloides*). *Ceanothus cuneatus* provides an average 10 percent cover in the 1–2 meter shrub layer but is only on 50 percent of the plots. *Toxicodendron diversilobum* is in half of the plots but averages only 1 percent cover. In some stands that have not been sampled, *Arctostaphylos viscida* may be an important shrub. The herb layer varies from 2–10 percent cover and averages 4 percent. No species are abundant in the herb layer. The most constant species from 50–75 percent constancy include *Pentagramma triangularis*, *Claytonia perfoliata*, *Galium parisiense*, and *Bromus hordeaceus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to occur throughout the foothills of the entire Sierra Nevada.

DATABASE CODE To be determined

COMMENTS:

Globally

Yosemite and environs

It is likely that there is another mesophytic association of this alliance with such species as *Fraxinus dipetala* from within the mapping area. No plots are available currently.

Plots used to describe association (n=5)

USGS-NPS Veg Data: 98M17, 99K53, 98K12, 99K12

Wieslander: 721

***Quercus douglasii/Ceanothus cuneatus/Poaceae* Forest**

COMMON NAME Blue Oak/Sedgeleaf Buckbrush/Grass Species Forest

SYNONYM None

PHYSIOGNOMIC CLASS Forest

PHYSIOGNOMIC SUBCLASS Evergreen forest

PHYSIOGNOMIC GROUP Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Calocedrus decurrens* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association occurs in the foothills and Sierra Nevada from Butte to Fresno counties, and in the Central Coast in Monterey and San Benito counties (Allen et al., 1991)

Yosemite and environs

Stands of *Quercus douglasii/Ceanothus cuneatus/Poaceae* Forest are sampled in the mapping area of Yosemite and environs specifically within the El Portal 7.5 minute topographic quadrangle.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Quercus douglasii*/*Ceanothus cuneatus*/*Poaceae* Forest are found at low elevations (300–3,800 feet) on all aspects of slopes that are moderately steep to very steep (25–63%). Soils are stony and gravelly sandy loams from granitic soils (basalts and shales) (Allen et al., 1991).

Yosemite and environs

The single plot sampled in this association locally is at 2,311 feet elevation on a steep, south-facing, midslope aspect with loamy soil derived from granitic rock.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Quercus douglasii</i> , <i>Pinus sabiniana</i>
Shrub	<i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

Yosemite and environs

Tree	<i>Quercus douglasii</i>
Shrub	<i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Quercus douglasii</i> , <i>Pinus sabiniana</i> , <i>Quercus wislizeni</i>
Shrub	<i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

Yosemite and environs

Tree	<i>Quercus douglasii</i>
Shrub	<i>Ceanothus cuneatus</i>
Herbaceous	<i>Poaceae</i>

VEGETATION DESCRIPTION

Globally

Stands of *Quercus douglasii*/*Ceanothus cuneatus*/*Poaceae* Forest are dominated by *Quercus douglasii* in the overstory, *Ceanothus cuneatus* in the understory shrub layer, and species of *Poaceae* in the understory herbaceous layer. *Pinus sabiniana* and *Quercus wislizeni* are usually found in this association. *Aesculus californica* is occasionally present. Other species present may include *Rhus crocea*, *Toxicodendron diversilobum*, and *Arctostaphylos viscida* (Allen et al., 1991).

Yosemite and environs

The tree cover is 20 percent, shrub cover 20 percent, and herbaceous cover 70 percent in one plot sampled locally. *Quercus douglasii* is 15 percent and *Quercus wislizeni* is 2.5 percent as the main tree species, while *Ceanothus cuneatus* covers 15 percent of the shrub layer. The dominant herb species include *Hypochaeris glabra* (15%), *Bromus tectorum* (15%), and *Daucus pusillus* (2.5%).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Likely to occur throughout much of the foothill belt of cismontane California but threatened to some degree by invasive exotics, development, and by higher than modal grazing pressure.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=1)

USGS–NPS Veg Data: 99S35

***Quercus douglasii* - *Pinus sabiniana*/Poaceae Woodland**

COMMON NAME	Blue Oak - Foothill Pine - Grass Species Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Deciduous woodland
PHYSIOGNOMIC GROUP	Cold deciduous woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Cold deciduous woodland
ALLIANCE	<i>Quercus douglasii</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is found in the foothills and Sierra regions from Placer to Fresno counties and in the central coast area from Monterey to Los Angeles counties (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus douglasii* - *Pinus sabiniana*/Poaceae Woodland are sampled in the mapping area of Yosemite and environs within the El Portal 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Quercus douglasii* - *Pinus sabiniana*/Poaceae Woodland are found at low elevations (300–4,000 feet) on all aspects, primarily on slopes of less than 35 percent but were occasionally found on flat areas. Soil textures range from gravel to clay loam from various parent materials (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus douglasii* - *Pinus sabiniana*/Poaceae Woodland are found at low elevations (1,700–2,600 feet) on the mid portions of southeast- to southwest-facing steep slopes. Soils are well drained to rapidly drained with textures of mostly clay loam of metamorphic parent material. Bedrock contributes 0–1 percent cover, large rocks contribute 2–3 percent cover, and small rocks contribute 5–20 percent cover. Litter contributes 45–88 percent cover, wood contributes 2–4 percent cover, and bare ground is 1–29 percent cover.

MOST ABUNDANT SPECIES

Globally

Tree *Quercus douglasii*, *Pinus sabiniana*
Herbaceous *Poaceae*

Yosemite and environs

Tree *Quercus douglasii*, *Quercus wislizeni*
Herbaceous *Poaceae*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus douglasii*, *Pinus sabiniana*, *Quercus wislizeni*
Herbaceous *Poaceae*

VEGETATION DESCRIPTION

Globally

Stands of *Quercus douglasii* - *Pinus sabiniana*/*Poaceae* Woodland are dominated by *Quercus douglasii* and *Pinus sabiniana* with an understory of grasses. Shrubs that may be found here may include *Lonicera subspicata*, *Ceanothus cuneatus*, and *Rhamnus crocea*. Rarely occurring are *Aesculus californica*, *Quercus agrifolia*, *Quercus lobata*, *Quercus wislizeni*, *Quercus durata*, *Umbellularia californica*, *Adenostoma fasciculatum*, *Artemisia californica*, *Arctostaphylos glauca*, *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), *Ceanothus leucodermis*, *Ceanothus sorediatus*, *Corylus cornuta*, *Eriodictyon californicum*, *Eriodictyon crassifolium*, *Eriogonum fasciculatum*, *Fraxinus dipetala*, *Ericameria linearifolia* (= *Haplopappus linearifolius*), *Hazardia squarrosa*, *Frangula californica* (= *Rhamnus californica*), *Toxicodendron diversilobum*, *Rhus trilobata*, *Ribes californicum*, and *Sambucus caerulea*. Most of the tree species in this association have a dbh between 4-11 inches, and some of the tree species have a dbh of 12-23 inches (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus douglasii* - *Pinus sabiniana*/*Poaceae* Woodland consist of 0–70 percent cover at 0–0.5 meter tall, 5–70 percent cover at 0.5–1 meter tall, 5 percent cover at 1–2 meters tall, 5 percent cover at 2–5 meters tall, 20 percent cover at 5–10 meters tall, 40 percent cover at 10–15 meters tall, and 60 percent cover at 15–20 meters tall. This association forms an open to continuous tree layer dominated by *Quercus douglasii* and *Pinus sabiniana* with an understory of grasses. *Quercus wislizeni* is also common in the tree layer. A variety of other species may be present, but *Avena barbata*, *Bromus arenarius*, *Bromus hordeaceus*, *Hypochaeris glabra*, *Lactuca serriola*, and *Trifolium microcephalum* are the most common species found in the understory. Others include *Bromus diandrus*, *Daucus pusillus*, *Lessingia leptoclada*, *Toxicodendron diversilobum*, and *Galium parisiense*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to occur throughout much of the foothill belt of cismontane California but threatened to some degree by invasive exotics, development, and by higher than modal grazing pressure.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association occurs in both the lower Tuolumne and Merced river canyons in the study area. It is usually associated with relatively well developed clay soils on slopes and transitions abruptly to *Pinus sabiniana* - *Quercus wislizeni* or chaparral types on less argillic soils.

Plots used to describe association (n=2)

USGS-NPS Veg Data: 99K18, 99K2

***Quercus douglasii/Bromus sp. - Daucus pusillus* Woodland [Provisional]**

COMMON NAME	Blue Oak/Brome Species - American Wild Carrot Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Deciduous woodland
PHYSIOGNOMIC GROUP	Cold deciduous woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Cold deciduous woodland

ALLIANCE *Quercus douglasii* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association is included within the broader description by Allen et al., (1991) called *Quercus douglasii*/grass. As described by them, the *Quercus douglasii*/grass association ranges from Shasta County to Tulare County and south in the coast ranges to San Luis Obispo County.

Yosemite and environs

Stands of *Quercus douglasii/Bromus sp. - Daucus pusillus* Woodland are found in the lowest elevations of the mapping area and were sampled within the El Portal and Cherry Lake South 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus douglasii/Bromus sp. - Daucus pusillus* Woodland are found at xeric to dry mesic environments at low elevations (2,300–3,800 feet) on the mid to high portions of southeast- to northwest-facing slopes that are variable in steepness (gentle to steep). Slopes tend to be linear to undulating. Soils are moderately well developed with textures ranging from sandy loam to clay loam from metamorphic parent material. The soils at these sites tend to be somewhat poorly drained to well drained. Fire in this association is common but usually is not extensive. Litter cover ranges from

45–95 percent but tends to be 80–90 percent. Invasion from exotic species is common at this association with impact levels of low to high.

MOST ABUNDANT SPECIES

Globally

This association is only known from the Yosemite Park. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus douglasii*
Herbaceous *Avena barbata*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Quercus douglasii*
Herbaceous *Bromus* sp., *Daucus pusillus*, *Avena barbata*, *Galium parisiense*, *Lactuca serriola*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus douglasii*/*Bromus* sp. - *Daucus pusillus* Woodland consist of 80–90 percent cover at 0–0.5 meter tall, 5–90 percent cover at 0.5–1 meter tall, 0–20 percent cover at 1–2 meters tall, 5 percent cover at 2–5 meters tall, 5–50 percent cover at 5–10 meters tall, 20–40 percent cover at 10–15 meters tall, and occasionally 20 percent cover at 20–35 meters tall. This association forms an open to intermittent tree layer dominated by *Quercus douglasii*. The understory is continuous with predominantly *Bromus* sp. (*Bromus hordeaceus*, *Bromus arenarius*, and *Bromus diandrus*), *Daucus pusillus*, *Avena barbata*, *Galium parisiense*, *Lactuca serriola*, and a large variety of other herbs and grasses. Often common is *Hypochaeris glabra*. *Trifolium microcephalum* and *Trifolium wormskioldii* are sometimes common. *Daucus pusillus*, *Castilleja densiflora*, *Silene gallica*, *Torilis arvensis*, *Brodiaea elegans*, *Vulpia myuros*, *Pinus sabiniana*, *Clarkia purpurea*, *Gilia capitata*, *Trifolium ciliolatum*, *Erodium cicutarium*, *Lupinus bicolor*, *Pellaea mucronata*, and *Quercus wislizeni* are often present contributing to minor cover. *Perideridia bacigalupii* is a rare species that may be contributing to minor cover in this association.

OTHER NOTEWORTHY SPECIES

Perideridia bacigalupii is a List 4 species (CNPS 2001) found at one of the five plots. It usually is found at chaparral, lower montane coniferous forests/serpentinite at elevations of 1,500–3,300 feet. This plant is found within Amador, Butte, Calaveras, Madera, Mariposa, Nevada, Tuolumne, and Yuba counties.

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to occur throughout much of the foothill belt of cismontane California but threatened to some degree by invasive exotics, development, and by higher than modal grazing pressure.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=5)

USGS-NPS Veg Data: 99S20, 98K10, 98K15, 98K22, 99K16

***Quercus douglasii* - *Quercus wislizeni*/Bromus sp. - *Daucus pusillus* Woodland**

COMMON NAME	Blue Oak - Interior Live Oak/Brome Species - American Wild Carrot Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Deciduous woodland
PHYSIOGNOMIC GROUP	Cold deciduous woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Cold deciduous woodland
 ALLIANCE	 <i>Quercus douglasii</i> Woodland Alliance
 CLASSIFICATION CONFIDENCE LEVEL	 2
 USFWS WETLAND SYSTEM	 Upland

RANGE

Globally

This association is found primarily in the foothills of the Sierra Nevada to Mariposa County (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus douglasii* - *Quercus wislizeni*/Bromus sp. - *Daucus pusillus* Woodland are sampled in the mapping area of Yosemite and environs within the El Portal 7.5 minute topographic quadrangle.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Quercus douglasii* - *Quercus wislizeni*/Bromus sp. - *Daucus pusillus* Woodland are found at low elevations (200–3,800 feet) on all aspects of slopes that are primarily less than 45 percent. Soil textures vary and are of granitic, metamorphic, and some sedimentary parent materials (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus douglasii* - *Quercus wislizeni*/Bromus sp. - *Daucus pusillus* Woodland are found at low elevations (1,700–2,100 feet) on the low to high portions of slopes of all aspects that are somewhat steep to steep. Soils are well drained to rapidly drained with textures ranging from sandy loam to clay loam from granitic, metamorphic, and some sedimentary parent materials. Soils are well drained to rapidly drained.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Quercus douglasii</i> , <i>Quercus wislizeni</i>
Herbaceous	<i>Bromus</i> sp., <i>Daucus pusillus</i>

Yosemite and environs

Tree *Quercus douglasii*, *Quercus wislizeni*
Herbaceous *Bromus* sp., *Daucus pusillus*

CHARACTERISTIC SPECIES

Globally

Tree *Quercus douglasii*, *Quercus wislizeni*
Herbaceous *Bromus* sp., *Daucus pusillus*

Yosemite and environs

Tree *Quercus douglasii*, *Quercus wislizeni*
Herbaceous *Bromus* sp. (*Bromus madritensis*, *Bromus arenarius*, *Bromus diandrus*, *Bromus hordeaceus*),
Daucus pusillus, *Torilis arvensis*, *Lactuca serriola*

VEGETATION DESCRIPTION

Globally

Stands of *Quercus douglasii* - *Quercus wislizeni*/*Bromus* sp. - *Daucus pusillus* Woodland are dominated by *Quercus douglasii* and *Quercus wislizeni* with an understory of grasses that are mainly composed of *Bromus* sp. and *Daucus pusillus*. *Pinus sabiniana* may also be found occurring in this association. Shrubs that may be found here include *Ceanothus cuneatus*, *Toxicodendron diversilobum*, *Arctostaphylos* sp., *Heteromeles arbutifolia*, and *Rhamnus crocea*. Rarely occurring are *Aesculus californica*, *Pinus ponderosa*, *Quercus chrysolepis*, *Quercus kelloggii*, *Quercus lobata*, *Acer macrophyllum*, *Pseudotsuga menziesii*, *Adenostoma fasciculatum*, *Artemisia californica*, *Arctostaphylos viscida*, *Cercocarpus montanus* var. *glaber* (= *Cercocarpus betuloides*), *Ceanothus leucodermis*, *Diplacus aurantiacus* (= *Mimulus aurantiacus*), *Eriodictyon californicum*, *Frangula californica* (= *Rhamnus californica*), *Rhus trilobata*, *Ribes* sp., *Ribes californicum*, *Sambucus caerulea*, *Xylococcus bicolor*, *Corethrogyne californica*, and *Ericameria arborescens* (= *Haplopappus arborescens*). Most of the tree species in this association have a dbh between 4–11 inches (Allen et al., 1991).

Yosemite and environs

Stands of *Quercus douglasii* - *Quercus wislizeni*/*Bromus* sp. - *Daucus pusillus* Woodland consist of 5–70 percent cover at 0–0.5 meter tall, 5–20 percent cover at 0.5–1 meter tall, 5 percent cover at 1–2 meters tall, 5–20 percent cover at 2–5 meters tall, 5 percent cover at 5–10 meters tall, 20–40 percent cover at 10–15 meters tall, and 5–60 percent cover at 15–20 meters tall. This association is dominated by *Quercus douglasii* and *Quercus wislizeni* with an understory of herbaceous species that are mainly composed of *Bromus* sp. (*Bromus madritensis*, *Bromus arenarius*, *Bromus diandrus*, *Bromus hordeaceus*), and *Daucus pusillus*. *Torilis arvensis* and *Lactuca serriola* are found contributing minor cover. A large variety of understory species are present and often include *Hypochaeris glabra*, *Toxicodendron diversilobum*, *Lessingia leptoclada*, *Avena barbata*, *Anaphalis margaritacea*, *Melica californica*, *Trifolium microcephalum*, *Centaurea melitensis*, and *Galium parisiense*. *Clarkia purpurea* is sometimes common in this association. Other species contributing to minor cover may include *Claytonia perfoliata*, *Galium aparine*, *Galium nuttallii*, *Lithophragma bolanderi*, *Medicago polymorpha*, *Pentagramma triangularis*, *Pinus sabiniana*, and *Yabea microcarpa*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably fairly common in the northern and the central Sierra Nevada foothills.

DATABASE CODE To be determined

COMMENTS

Globally

Information was obtained from Allen et al., (1991) for the Interior Live Oak-Blue Oak/Grass association.

Yosemite and environs

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99S12, 99S13, 99S15, 99S34, 99K3, 98M12

ECOLOGICAL ZONE III: FORESTS, SCRUBS, AND MEADOWS OF THE MIDELEVATION WEST SLOPE

HERBACEOUS VEGETATION

Lupinus latifolius Herbaceous Vegetation [Provisional]

COMMON NAME	Broadleaf Lupine Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Low temperate or subpolar perennial forb vegetation

ALLIANCE *Lupinus latifolius* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association is described only from the vicinity of Yosemite. Information about its global range is not available without additional inventory. However, *Lupinus latifolius* is found throughout the mountainous regions of the western United States (USDA NRCS PLANTS database 2001) and is likely to form other stands in California and other states. Similar stands have been observed in the Klamath Mountains and the north coast ranges of California (Keeler–Wolf pers. obs.). Don Potter (pers com 2002) has sampled 14 plots that he characterized as *Lupinus latifolius* plots throughout the central and southern Sierra Nevada.

Yosemite and environs

This association has been documented from stands in the Ackerson Meadow and Tenaya Lake 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this forb association occur in wet to moist meadow environments including small stream channels and seeps. Sites are mesic to temporarily saturated meadows. Elevations range from about 6,200–8,200 feet, and slopes are flat, gentle, or moderate and, when having an aspect, face southeast to west. Soils are somewhat poorly drained loam to moderately well drained sandy loam.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Lupinus latifolius*, *Heracleum maximum*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Lupinus latifolius*, *Heracleum maximum*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This perennial forb vegetation is characterized by dense cover (from 60–90%) of moisture-loving forbs and grasses, primarily *Lupinus latifolius*. Total vegetative cover is generally greater than 80 percent. *Lupinus latifolius* (10–67% cover) is the most common forb. Other forbs of greater than 50 percent constancy include *Heracleum maximum* (10–30 percent), *Allium validum* (5% cover), *Thalictrum fendleri* (2%), *Trifolium monanthum* (2.5%), *Poa pratensis* (1%), *Danthonia intermedia* (1%), *Carex leptopoda* (5%), and *Poa fendleriana* (1%). The forbs and graminoids present in trace amounts include an additional 30 species.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably widespread, but no information.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Locally these stands are relatively small and occur in meadows surrounded by White Fir - Sugar Pine, Red Fir - White Fir, and Red Fir alliances. There is some uncertainty about the classification of this association. It may be more properly placed in the *Heracleum maximum* alliance (currently described from Montana and Wyoming in NatureServe). Halpern (1986) has described an *Elymus glaucus* - *Heracleum maximum* association from Sequoia National Park that bears some resemblance to the local association. Another confusion is that *Lupinus polyphyllus* and *Lupinus latifolius* are similar and either one or the other may dominate these sites. In general *Lupinus polyphyllus* is more of a hydrophyte.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98K61, 99K136, 98K125

NRI: 114

***Solidago canadensis* - *Achillea millefolium* Herbaceous Vegetation [Provisional]**

COMMON NAME	Canada Goldenrod - Common Yarrow Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Low temperate or subpolar perennial forb vegetation

ALLIANCE *Solidago canadensis* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. However, *Solidago canadensis* is found in every state in the union (USDA NRCS PLANTS database 2001) and is likely to form other stands in California and other states.

Yosemite and environs

This association has been documented from stands in Ackerson Mountain, Half Dome, Wawona, and White Chief Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this forb association occur in dry to moist meadow environments. Sites are mesic to temporarily saturated meadows. Elevations range from about 5,620–7,000 feet, and slopes are flat, gentle, or moderate and, when having an aspect, face southeast to west. Soils are somewhat poorly drained loam to silty loam.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Solidago canadensis*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Solidago canadensis*, *Achillea millefolium*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This perennial forb vegetation is characterized by dense cover of moisture-loving forbs and grasses, primarily *Solidago canadensis*. Total vegetative cover is generally greater than 80 percent. *Solidago canadensis* (35–67% cover) is the most common forb. Other forbs of greater than 50 percent constancy include *Achillea millefolium* (5% cover), *Horkelia fusca* (5%), *Agrostis scabra* (2.5%), *Mimulus primuloides* (2%), *Poa pratensis* (1%), *Potentilla gracilis* (1%), and *Deschampsia caespitosa* (1%). The forbs and graminoids present in trace amounts include an additional 30 species.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably widespread, but no information

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Locally these stands are relatively small and occur in meadows surrounded by White Fir - Sugar Pine, Red Fir - White Fir, and Red Fir alliances.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99K104, 99S121, 98M61

NRI: 284

***Veratrum californicum* - *Senecio triangularis* Herbaceous Vegetation**

COMMON NAME California False Hellebore - Arrowleaf Ragwort Herbaceous Vegetation

SYNONYM None

PHYSIOGNOMIC CLASS Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS Perennial forb vegetation

PHYSIOGNOMIC GROUP Temperate or subpolar perennial forb vegetation

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Temporarily flooded temperate perennial forb vegetation

ALLIANCE *Veratrum californicum* Temporarily Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association has been described from Yosemite and environs and the Lake Tahoe region of California, Oregon, and western Nevada (Manning and Padgett, 1991). Information about its global characteristics is not available without additional inventory. Don Potter (pers com 2002) has sampled 38 plots that he considers this association throughout the central and southern Sierra Nevada but has not described them formally.

Yosemite and environs

This association is widespread but localized in meadows and riparian settings in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association occurs between 7,400–10,000 feet in elevation on gentle to moderate slopes and is often found along streams. Aspects are commonly northern and eastern. Soil parent materials are varied. Soil textures range from silt loams to muck and are moderately well drained to poorly drained. Sites are palustrine, ranging from seasonally saturated to intermittently flooded.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Veratrum californicum*

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Veratrum californicum*, *Senecio triangularis*

VEGETATION DESCRIPTION

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association is characterized by a high cover of herbaceous meadow species with no tree cover. Shrub cover is open including *Salix lasiolepis* and *Cornus sericea* ssp. *sericea*, although more commonly there are no shrubs. *Veratrum californicum*, *Lupinus latifolius*, *Senecio triangularis*, *Epilobium ciliatum*, and *Glyceria striata* (= *Glyceria elata*) are the most frequent herbaceous species, while *Senecio triangularis*, *Veratrum californicum*, *Lupinus latifolius*, and *Allium validum* have the highest cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4S3

RANK JUSTIFICATION Restricted to moist meadows in Oregon, California, and western Nevada; probably some threats by grazing outside of protected areas.

DATABASE CODE CEG001989

COMMENTS

Globally

This association has been considered part of the *Senecio triangularis* alliance by Manning and Padgett (1991). Their description suggests that *Senecio triangularis* is the dominant species. However, locally *Veratrum* is dominant. Regardless of which alliance it is placed in, this is most likely a single association.

Yosemite and environs

Plots used to describe association (n=4)

USGS-NPS Veg Data: 98K66, 98M105, 98K95

Potter: 1511

***Glyceria striata* (*Glyceria elata*, Hickman 1993) Herbaceous Vegetation [Provisional]**

COMMON NAME

Fowl Manna Grass Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Temporarily flooded temperate or subpolar grassland

ALLIANCE

Glyceria striata Temporarily Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association has been defined within Sequoia National Park (Halpern, 1986).

Yosemite and environs

Stands of *Glyceria striata* (= *Glyceria elata*) Herbaceous Vegetation were sampled within the Koip Peak, Ackerson Mountain, and Mammoth Lake 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is common along meadow edges on elevated flats in the driest portions of montane meadows in broad, open basins of the mixed conifer forest zone of Sequoia National Park (Halpern, 1986).

Yosemite and environs

Stands of *Glyceria striata* (= *Glyceria elata*) Herbaceous Vegetation are found at mid to high elevations (6,000–10,500 feet) on flat to moderate slopes. This association is found at basin floors and in seeps from low to upper portions of slopes. It is found at moist sites such as margins of lake beds, meadows, channel beds, and drainages that are seasonally flooded to saturated or permanently flooded. Soils are usually moist with textures that range from sand to muck on a granitic substrate. Drainage is poor to rapid. Litter cover is often high (10–85 percent cover), and bare soil varies but is high (10–70 percent). Disturbance levels are usually low.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Glyceria striata* (= *Glyceria elata*) (Halpern, 1986)

Yosemite and environs

Herbaceous *Glyceria striata* (= *Glyceria elata*)

CHARACTERISTIC SPECIES

Globally

Herbaceous *Glyceria striata* (= *Glyceria elata*) (Halpern, 1986)

Yosemite and environs

Herbaceous *Glyceria striata* (= *Glyceria elata*)

VEGETATION DESCRIPTION

Globally

Only *Glyceria striata* (= *Glyceria elata*) reaches high cover (> 30%) in Sequoia National Park. Species of greatest constancy and cover (in Sequoia National Park) include *Lotus oblongifolius*, *Senecio clarkianus*, *Castilleja miniata*, *Solidago canadensis*, and *Glyceria elata*. Species of *Cyperaceae* occur occasionally but are more common on wetter sites. Additional species commonly occurring (> 75% constancy) are *Veratrum californicum*, *Elymus glaucus* ssp. *jepsonii*, *Oxypolis occidentalis*, *Sidalcea ranunculacea*, *Stachys albens*, *Senecio triangularis*, *Viola glabella*, and *Habenaria dilatata* (Halpern, 1986).

Yosemite and environs

Stands of *Glyceria striata* (= *Glyceria elata*) Herbaceous Vegetation form a continuous herbaceous layer of predominantly *Glyceria striata* (= *Glyceria elata*). *Senecio triangularis*, *Perideridia parishii*, *Polygonum bistortoides*, and *Veratrum californicum* are often found in this association. *Mimulus guttatus*, *Aconitum columbianum*, *Carex nervina*, and *Calamagrostis canadensis* are common in some stands. A large variety of other herbaceous species are present such as *Lotus oblongifolius*, *Mimulus primuloides*, *Senecio scorzonella*, *Agrostis exarata*, *Agrostis oregonensis*, *Galium triflorum*, *Juncus chlorocephalus*, *Lilium parvum*, *Lupinus burkei* ssp. *burkei*, *Lupinus latifolius*, *Muhlenbergia filiformis*, *Rudbeckia californica*, *Stachys albens*, *Equisetum arvense*, *Isoetes bolanderi* (= var. *pygmaea*), *Oxypolis occidentalis*, and *Sidalcea reptans*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

RANK JUSTIFICATION Likely to be of limited extent in California and western North American mountains.

DATABASE CODE To be determined

COMMENTS

Global

Potter's plots (Don Potter pers com 2002) often go to types dominated by these species: *Senecio triangularis*, *Polygonum bistortoides*, *Veratrum californicum*. Clearly, ecological similarities exist between these types and should be resolved with further sampling and analysis.

Yosemite and environs

Stands are generally small and restricted to wet meadows and saturated streambanks in openings in Red Fir forest alliance.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K137, 99S137, 98K102, 98K122, 99K163, 99K127

***Poa pratensis* Herbaceous Vegetation**

COMMON NAME

Kentucky Bluegrass Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Temporarily flooded temperate or subpolar grassland

ALLIANCE

Poa pratensis Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association has been defined from central and southern Sierra Nevada. Don Potter has sampled 32 stands throughout central and southern Sierra Nevada (pers com. 2002).

Yosemite and environs

Stands of *Poa pratensis* Herbaceous Vegetation are sampled in the mapping area of Yosemite and environs within the El Capitan, Ackerson Mountain, and Mammoth Lake 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Potter (2000) has sampled 32 stands of this vegetation in central and southern Sierra Nevada. Elevations range mostly from 4,900–8,500 feet generally in the montane but below the subalpine zone. Stands occupy mesic meadows where slopes average 4 percent and range from 0.5–8 percent. Sites are often on elevated portions of meadows at the bottom of wide valleys. Meadows are forested at their edges. Most meadows contain first and second order streams less than 5 meters wide. Surface topography is concave to undulating. Seasonal flooding from upstream sources is typical, and sites may be covered with standing water during runoff. Sites typically go drier by the end of summer. Compared to other meadow sites, these are generally mesic to very dry stands.

Yosemite and environs

Stands of *Poa pratensis* Herbaceous Vegetation are found at midelevations (3,900–6,500 feet) on flat to moderate slopes. This association is found at basin floors and low to upper portions of slopes. It is found at moist sites such as meadows and drainages that are seasonally flooded to saturated. Soils are usually moist with textures that are clay loam on a granitic substrate. Drainage is poor to moderate. Litter cover is variable but often high (10–85% cover), and bare soil

varies (10–70%). Disturbance levels are usually low currently, but belie a site history that involves grazing and pasturing in many cases.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Poa pratensis*, *Carex integra*, *Achillea millefolium*

Yosemite and environs

Herbaceous *Poa pratensis*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Poa pratensis*

Yosemite and environs

Herbaceous *Poa pratensis*

VEGETATION DESCRIPTION

Globally

Stands are dense (ca. 100% cover) with forbs and graminoids both contributing about equal cover. *Poa pratensis* averages 36 percent cover, *Carex integra* 33 percent cover, and *Achnatherum occidentale* 15 percent cover. For forbs, *Achillea millefolium* averages 23 percent and *Potentilla gracilis* 20 percent cover along with 12 percent cover for *Perideridia parishii* and 12 percent cover for the annual *Polygonum douglasii*. A number of other species of graminoids and forbs are present at low cover and constancy. Occasionally *Juncus mexicanus* can have high cover, but it is infrequent.

Yosemite and environs

Stands of *Poa pratensis* Herbaceous Vegetation form a continuous (90–100%) herbaceous layer of predominantly *Poa pratensis* (51% average cover). A large variety of other herbaceous species are present; the most important constant species include *Potentilla glandulosa*, *Achillea millefolium*, *Mimulus guttatus*, and *Potentilla gracilis*. Stands on the east side of the crest may have significant *Wyethia mollis*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5

RANK JUSTIFICATION Widespread in California and western North American mountains.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association is transitional between wet and dry meadow sites. It is ecologically related to the *Elymus glaucus* associations and to *Calamagrostis canadensis*, *Glyceria striata* (= *Glyceria elata*), and *Solidago canadensis* associations. This is an indicator of past or ongoing disturbance. Many stands were probably initiated by the introduction of seed in livestock feed. This current association description also includes *Poa pratensis* - *Achillea millefolium* from the preliminary classification.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 98K30, 98K26, 98M72

NRI: 66, 151, 283

***Carex vesicaria* Herbaceous Vegetation**

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

PHYSIOGNOMIC SUBGROUP

FORMATION

Inflated Sedge Herbaceous Vegetation

None

Herbaceous Vegetation

Perennial graminoid vegetation

Temperate or subpolar grassland

Natural/Seminatural

Seasonally flooded temperate or subpolar grassland

ALLIANCE

Carex vesicaria Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is known from stands throughout the montane western United States (NatureServe 2002).

Yosemite and environs

Stands of this association are found throughout the central montane portions of the park.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of this vegetation type are commonly found in wet meadows, around the edges of montane lakes and beaver ponds, along the margins of slow-moving reaches of streams and rivers, and in marshy swales and overflow channels on broad floodplains throughout the western United States. Elevations range up to 9,500 feet in Colorado. They can occur in standing water or on sites that become relatively dry during the later part of the growing season. Many sites are located where beaver ponds have filled with sediment. A wide range of soils are associated with this alliance. Histosols are most common and often have organic accumulations greater than 1 meter thick. Mollisols and Entisols are also associated with this type. Soil texture varies widely from loamy clay to sandy loam.

Yosemite and environs

This association has been described from stands in seasonally saturated meadows, on valley floors, and on stream terraces. Elevations range from 6,000–8,200 feet. Slopes are very gentle, and aspect is not diagnostic for the type. Soils are all poorly drained and contain high levels of organic material. Soil varies from muck to silt clay.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Carex vesicaria*

Yosemite and environs

Herbaceous *Carex vesicaria*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Carex vesicaria*

Yosemite and environs

Herbaceous *Carex vesicaria*

VEGETATION DESCRIPTION

Globally

This association is characterized by the dominance of *Carex vesicaria*, with 20–98 percent cover. Other graminoids can be present and can be codominant. *Juncus balticus*, *Deschampsia caespitosa*, *Carex nebrascensis*, *Carex utriculata*, *Eleocharis palustris*, and *Glyceria* spp. are some of the more common associated species. Forbs can include species of *Epilobium* sp., *Galium trifidum*, *Camassia quamash*, *Symphyotrichum foliaceum* (= *Aster foliaceus*), *Equisetum arvense*, and *Mentha arvensis*.

Yosemite and environs

Stands of this vegetation are heavily dominated by the diagnostic graminoid *Carex vesicaria* (62.5% cover) with highly variable graminoid and forb associates. Graminoids present may include *Deschampsia caespitosa*, *Carex* spp., and/or *Juncus* spp. The forbs *Epilobium* sp. and *Stachys palustris* occur in trace amounts at about half of the stands. Other forbs, which may be locally common, include *Pteridium aquilinum* (15% cover), *Dodecatheon jeffreyi* (9.3% cover), *Heracleum maximum* (9.3% cover), and/or *Polygonum bistortoides* (9.3% cover). Several other species may occur at trace amounts and low frequencies.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4Q

RANK JUSTIFICATION

DATABASE CODE Cegl002661

COMMENTS

Globally

This type appears to be a simple dominance type with *Carex vesicaria* and occasionally *Carex uliginosa* as the only species of significance.

Yosemite and environs

It is easy to mistake *Carex vesicaria* for *Carex uliginosa* without the fruits. Both species are ecologically similar, although *Carex vesicaria* tends to be more prevalent at edges of water bodies that draw down significantly through the wet season.

Plots used to describe association (n=8)

USGS–NPS Veg Data: 99K102, 99K113, 99K115, 99S133

Potter: 1613, 1611, 1615, 1649

***Carex utriculata* Herbaceous Vegetation**

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

PHYSIOGNOMIC SUBGROUP

FORMATION

ALLIANCE

Beaked Sedge Herbaceous Vegetation

None

Herbaceous Vegetation

Perennial graminoid vegetation

Temperate or subpolar grassland

Natural/Seminatural

Seasonally flooded temperate or subpolar grassland

Carex (rostrata, utriculata) Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association has been defined within Sequoia National Park and Inyo National Forest (Halpern, 1986; Taylor, 1984). The alliance has been defined for many of the United States and Canada, but descriptions of associations solely dominated by *Carex utriculata* are lacking except for the Sierra Nevada.

Yosemite and environs

Stands of *Carex utriculata* Herbaceous Vegetation were sampled within the Tenaya Lake, Tamarack Flat, Tioga Pass, and Ackerson Mountain 7.5-minute and Hetch Hetchy Reservoir 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

The association occurs under a variety of topographic and hydrologic regimes. Under deeply pooled water, pure stands of *Carex rostrata* develop. On sloping sites or under conditions of decreased water tables, *C. rostrata* abundance and vigor decrease and species diversity increases in moderately open basins of the mixed conifer forest zone (Halpern, 1986).

Yosemite and environs

Stands of *Carex utriculata* Herbaceous Vegetation are found at low to high elevations (4,600–9,800 feet) on flat to gentle (0–2 degrees) slopes with all aspects. These sites are located on basin floors, valley bottoms, meadows, and at the edges of lake and ponds where soils are semipermanently to permanently flooded. Soils are silty loam to muck on a granitic substrate. They are poorly drained and often very poorly drained. Litter cover varies ranging from 15–100 percent cover. Fire and disturbance are uncommon at these sites.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Carex utriculata* (Halpern, 1986; Taylor, 1984)

Yosemite and environs

Herbaceous *Carex utriculata*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Carex utriculata* (Halpern, 1986; Taylor, 1984)

Yosemite and environs

Herbaceous *Carex utriculata*

VEGETATION DESCRIPTION

Globally

Detailed descriptions for this association are lacking. The literature suggests that the stands are strongly dominated by *Carex uliginosa* (Halpern, 1986; Taylor, 1984).

Yosemite and environs

Stands of *Carex utriculata* Herbaceous Vegetation form an open to continuous herbaceous layer dominated by *Carex utriculata*. The presence of other species that may also be common in this association vary and may include *Scirpus microcarpus*, *Dodecatheon jeffreyi*, *Polygonum bistortoides*, *Potamogeton gramineus*, *Schoenoplectus acutus* var. *acutus*, *Eleocharis parishii*, *Camassia quamash* ssp. *breviflora*, *Eleocharis palustris*, *Heracleum maximum*, *Juncus chlorocephalus*, *Scirpus diffusus*, Moss spp., *Hypericum anagalloides*, and *Eleocharis pauciflora*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This association is common in the Sierra Nevada and may occur elsewhere in the western United States.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

It is easy to mistake *Carex vesicaria* for *Carex utriculata* without the fruits. Both species are ecologically similar, although *Carex vesicaria* tends to be more prevalent at edges of water bodies that draw down significantly through the wet season.

Plots used to describe association (n=11)

USGS-NPS Veg Data: 98K74, 98M85, 98K69, 98K97, 98M90, 99S108, 99S136
Potter: 1607, 1609, 1663, 1030

Carex nebrascensis Herbaceous Vegetation

COMMON NAME

Nebraska Sedge Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Seasonally flooded temperate or subpolar grassland

ALLIANCE

Carex nebrascensis Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

These wetlands occur along the margins of streambanks, lakes, and seeps on the western Great Plains and into the western mountain regions of the United States. Don Potter (pers com 2002) has defined this association from 21 plots sampled throughout the Sierra Nevada.

Yosemite and environs

Stands of this association have been found outside the park but within the environs.

ENVIRONMENTAL DESCRIPTION

Globally

Vegetation types within this seasonally flooded, temperate, or subpolar grassland occur on saturated soils of flat floodplains bordering ponds or pools adjacent to stream channels. Stands also occur on flat marshy areas surrounding springs or wet meadows. Elevations range from sea level in California to 7,900 feet in Colorado. The alluvial soils are heavy clays and silty clay loams with high organic matter content. Soils are alkaline in some sites. Anoxic conditions often occur within 20 centimeters of the surface either in the form of a gleyed layer or abundant mottling. Soils often remain saturated throughout the summer, but water tables occasionally drop below 1 meter of the soil surface by the end of the growing season. This alliance is dominated by 30–98 percent cover of *Carex nebrascensis*. *Carex nebrascensis* typically occurs on sites where water flows over the surface but does not pond.

Yosemite and environs

This wetland association has been found between 6,500–9,200 feet of elevation on flat to gently sloping meadows and stream terraces. Stands are located on both the eastern and western margins of the park. Aspect is not a diagnostic feature of this type. Soils are poorly drained silts and sandy loams with high organic content. Potter (pers com 2002) found little gleying in his plots in the Sierra Nevada.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Carex nebrascensis*

Yosemite and environs

Herbaceous *Carex nebrascensis*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Carex nebrascensis*

Yosemite and environs

Herbaceous *Carex nebrascensis*

VEGETATION DESCRIPTION

Globally

This association is dominated by 30–98 percent cover of *Carex nebrascensis*. Other graminoids may include *Eleocharis palustris*, *Carex praegracilis*, *Catabrosa aquatica*, *Calamagrostis stricta*, *Triglochin maritima*, and *Schoenoplectus pungens* (= *Scirpus pungens*). Forb cover is generally low according to NatureServe alliance level description, but Potter (pers com 2002) has found forb cover high in other parts of the Sierra Nevada including such species as *Polygonum bistortoides*, *Periderida parish*, and *Mimulus primuloides*.

Yosemite and environs

This association forms intermittent to continuous herbaceous cover heavily dominated by graminoids. *Carex nebrascensis* (70% cover) is the only constant species. Graminoid associates may include *Juncus nevadensis*, *Glyceria striata* (= *Glyceria elata*), *Juncus mexicanus*, *Juncus* spp., and *Agrostis* spp. Forb cover and constancy are low. *Oxypolis occidentalis* (12.5% cover) may be common in some stands. Other locally common forbs may include *Muhlenbergia richardsonis*, *Polygonum bistortoides*, and/or *Trifolium monanthum*, *Trifolium monanthum*, *T. longipes*, or *T. wormskjoldgi*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4

RANK JUSTIFICATION This association is fairly widespread and secure.

DATABASE CODE CEG001813

COMMENTS

Globally

This association is extremely widespread and associates may vary from region to region. It is possible the association will be subdivided.

Yosemite and environs

Plots used to describe association (n=3)

USGS-NPS Veg Data: 98M109, 99K130, 99K138

SHRUB/SCRUB ASSOCIATIONS OF ECOLOGICAL ZONE III

***Arctostaphylos patula* Shrubland**

COMMON NAME

Greenleaf Manzanita Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Evergreen shrubland

PHYSIOGNOMIC GROUP

Temperate broad-leaved evergreen shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE

Arctostaphylos patula Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely that this association ranges throughout the Sierra Nevada and perhaps elsewhere in montane California.

Yosemite and environs

Stands of *Arctostaphylos patula* Shrubland are sampled in the mapping area of Yosemite and environs within the Ackerson Mountain, Cherry Lake South, and El Capitan 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Arctostaphylos patula* Shrubland are found at low to midelevations (4,900–8,300 feet) on mid to high portions of slopes with all aspects. The slopes tend to be linear and moderately steep to abrupt (10–70 degrees). This association is found on moderately deep to deep soils and occasionally on shallow soils. Soils are poorly drained to well drained with textures ranging from stony and gravelly to loam from sedimentary and granitic parent materials. Although fires in this type can be small due to resistance to ignition, they can support catastrophic fires once they get started. Litter can contribute to 30–78 percent cover, wood can contribute to 7–30 percent cover, and bare soil can range from 0–35 percent cover. Disturbance in the form of invasion by exotics, logging, improper burning regime, and road and trail construction occur in low to high intensity. Most stands are the result of fire or other natural or unnatural process. Many stands could support conifer woodland or forest with long intervals between fires or other disturbance processes.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Arctostaphylos patula*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Arctostaphylos patula*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Arctostaphylos patula* Shrubland consist of 0–5 percent cover at 0–0.5 meter tall, 10–80 percent cover at 0.5–1 meter tall, 0–60 percent cover at 1–2 meters tall, 0–20 percent cover at 2–5 meters tall, 0–30 percent cover at 5–10 meters tall, 0–30 percent cover at 10–15 meters tall, and 0–20 percent cover at 15–20 meters tall. This association forms open to moderately dense stands dominated by *Arctostaphylos patula*. Often found in this association are *Abies concolor*, *Calocedrus decurrens*, *Quercus kelloggii*, and *Chamaebatia foliolosa*. Occasionally, *Pinus jeffreyi*, *Quercus kelloggii*, and *Apocynum androsaemifolium* are present. A variety of other species present in this association may include *Carex multicaulis*, *Ceanothus parvifolius*, *Ceanothus cordulatus*, *Chamaesyce serpyllifolia*, *Lupinus breweri*, and *Prunus emarginata*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5?

RANK JUSTIFICATION Probably a widespread seral association of the mountains of California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Stands of this association are variable in their disturbance regimes. Some are clearly seral to forest types, and others are edaphically controlled, probably persisting from 50 to more than 100 years at least without being invaded by conifers. In the classification of these plots, the analysis showed the dominance of *Arctostaphylos patula* to be influential with little support for the further differentiation based on the variety of associated species.

Plots used to describe association (n=17)

USGS–NPS Veg Data: 98M68, 98M73, 99K26

NRI: 276

Wieslander: 513, 517, 293, 769, 578, 570, 403, 695, 304, 292, 264, 207, 307

Ceanothus cordulatus Shrubland

COMMON NAME

Mountain Whitethorn Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Evergreen shrubland

PHYSIOGNOMIC GROUP

Temperate broad-leaved evergreen shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminal

FORMATION

Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE

Ceanothus cordulatus Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus cordulatus* Shrubland are sampled in the mapping area of Yosemite and environs throughout the western side of the park within Zone III. Many plots are within the Ackerson Mountain 7.5-minute topographic quadrangle, which has experienced fire recently.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus cordulatus* Shrubland are found at midelevations (5,500–7,200 feet) on the mid to upper portions of gentle to steep slopes (3–31 degrees). This association is found on all aspects of linear or convex-shaped slopes. Soils are formed on a granitic substrate and are moderately well developed with textures that range from loamy gravelly sand to clay loam. These sites are well drained to poorly drained with soil depths ranging from moderately deep to deep. Fire is

common in this association, and litter cover can be high in stands where there has not been recent fire. This is often associated with canopy openings of *Abies concolor* in postburn communities.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Ceanothus cordulatus*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Ceanothus cordulatus*, *Arctostaphylos patula*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Ceanothus cordulatus* Shrubland form an intermittent to continuous shrub layer dominated by *Ceanothus cordulatus*. Tree species are occasionally present and may include *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*, *Pinus ponderosa*, and *Quercus kelloggii*; however, these are often in the shrub layer and contribute to minor cover. *Arctostaphylos patula* is usually found in the shrub layer. Occasional shrubs include *Ribes roezlii* (= *Grossularia roezlii*), *Chrysolepis sempervirens*, and *Ceanothus parvifolius*. *Ceanothus cuneatus*, *Prunus emarginata*, and *Prunus virginiana* var. *demissa* can be common in some stands. The herbaceous layer is open and may include *Gayophytum diffusum*, *Hackelia velutina*, *Bromus tectorum*, and *Lupinus* sp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to be a common seral association under current disturbance regimes in California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Many stands are transitional to *Abies concolor*/*Ceanothus cordulatus* Forest or other associations within the *Abies concolor* - *Pinus lambertiana* Alliance (see those descriptions). The most extensive stands of this association occur in areas where the canopies of White fir-Sugar Pine alliance and White fir-Red fir alliance have been eliminated by crown

fire. Stands along the Tioga Road, which developed following the 1988 fire, were beginning to be overtopped by scattered sapling conifers in the summer of 2002, 14 years after the fire.

Plots used to describe association (n=13)

USGS–NPS Veg Data: 98M70, 98K58, 98K62

NRI: 348

Wieslander: 588, 582, 727, 554, 553, 574, 405, 711, 288

***Quercus vaccinifolia* - *Chrysolepis sempervirens* Shrubland [Provisional]**

COMMON NAME	Huckleberry Oak - Sierran Chinquapin Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Sclerophyllous temperate broad-leaved evergreen shrubland
ALLIANCE	<i>Quercus vaccinifolia</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus vaccinifolia* - *Chrysolepis sempervirens* Shrubland are found across moderate to high elevations on the west slope and were sampled within the Falls Ridge 7.5-minute topographic quadrangle.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus vaccinifolia* - *Chrysolepis sempervirens* Shrubland are found at mid to high elevations (6,700–8,600 feet) on moderate to somewhat steep slopes (10–20 degrees). Slopes are generally convex in shape. Aspect ranges from east to west; however, easterly aspects are most frequent. Soils are often poorly developed with textures ranging from stony to loamy sand on granitic parent material. Soils are easily drained to poorly drained, and depths are shallow to moderately deep. Fire is common. Many of these stands occur on granitic domes and are often in association with a sparse emergent layer of *Pinus jeffreyi*.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Quercus vaccinifolia*, *Chrysolepis sempervirens*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Quercus vaccinifolia*, *Chrysolepis sempervirens*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Quercus vaccinifolia* - *Chrysolepis sempervirens* Shrubland have an intermittent to continuous shrub canopy dominated by *Quercus vaccinifolia* and *Chrysolepis sempervirens*. Also in the shrub layer is *Arctostaphylos patula* and *Prunus emarginata* and occasionally *Ceanothus cordulatus*. A variety of other species are found contributing to minor cover including *Achnatherum occidentale* ssp. *californicum*, *Apocynum androsaemifolium*, *Arnica nevadensis*, *Carex hoodii*, *Carex raynoldsii*, *Carex rossii*, *Carex specifica*, *Elymus elymoides* ssp. *californicus*, *Erigeron breweri*, *Holodiscus discolor*, *Juniperus communis*, *Juncus parryi*, *Kelloggia galioides*, *Penstemon rostriflorus*, *Pinus contorta* var. *murrayana*, *Populus tremuloides*, *Viola purpurea*, *Pseudotsuga menziesii*, *Quercus kelloggii*, and *Ribes* sp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to be common in the northern and central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Many stands are transitional to *Pinus jeffreyi*/*Quercus vaccinifolia* Woodland (see that description).

Plots used to describe association (n=4)

USGS-NPS Veg Data: 98K113

Wieslander: 468, 488, 496

***Quercus vaccinifolia* - *Arctostaphylos patula* Shrubland**

COMMON NAME	Huckleberry Oak - Greenleaf Manzanita Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE *Quercus vaccinifolia* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been defined on granitic substrates in the Klamath Mountains within Siskiyou and Trinity counties, California (Sawyer and Thornburg, 1977).

Yosemite and environs

Stands of *Quercus vaccinifolia* - *Arctostaphylos patula* Shrubland are sampled throughout the mapping area on both the west and occasionally the east side within the Mammoth Lakes 7.5 minute topographic quadrangle of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

Sawyer and Thornburg (1977) suggest this association occurs on south- and southwest-facing exposures on open granitic slopes between 5,000 and 7,000 feet elevation in the Klamath Mountains.

Yosemite and environs

Stands of *Quercus vaccinifolia* - *Arctostaphylos patula* Shrubland are found at midelevations (7,000–8,500 feet) on flat to steep (0–36 degrees) slopes. Aspects range from northeast to west but are often northeast, east, and southeast. This association is found on sites with often poorly developed soils with textures ranging from stony to stony gravelly loam. Soils are well drained to poorly drained and shallow to moderately deep. Parent material is granitic.

MOST ABUNDANT SPECIES

Globally

Shrub *Quercus vaccinifolia*, *Arctostaphylos patula* (Sawyer and Thornburg, 1977).

Yosemite and environs

Shrub *Quercus vaccinifolia*, *Arctostaphylos patula*

CHARACTERISTIC SPECIES

Globally

Shrub *Quercus vaccinifolia*, *Arctostaphylos patula* (Sawyer and Thornburg, 1977)

Yosemite and environs

Shrub *Quercus vaccinifolia*, *Arctostaphylos patula*

VEGETATION DESCRIPTION

Globally

Intermittent to continuous cover of both *Quercus vaccinifolia* and *Arctostaphylos patula* (either may be dominant) with scattered herbs including *Penstemon newberryi* and *Streptanthus tortuosus*. *Pinus jeffreyi*, *Abies magnifica*, and *Abies concolor* may be emergent (Sawyer and Thornburg, 1977).

Yosemite and environs

Stands of *Quercus vaccinifolia* - *Arctostaphylos patula* Shrubland form an intermittent shrub layer dominated by *Quercus vaccinifolia* and *Arctostaphylos patula*. *Pinus jeffreyi* and *Abies magnifica* are occasionally present in the sparse overstory. *Ceanothus cordulatus*, *Prunus emarginata*, *Arctostaphylos nevadensis*, and *Garrya fremontii* are often found in the shrub layer. Other shrub species that may be present include *Chrysolepis sempervirens* and *Ceanothus integerrimus* (= var. *californicus*). A variety of herbaceous species found contributing to low cover might include *Achnatherum speciosum*, *Amelanchier utahensis*, *Arabis* sp., *Gayophytum diffusum*, *Juncus parryi*, *Leptodactylon pungens*, *Penstemon azureus*, *Penstemon newberryi*, and *Symphoricarpos rotundifolius*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Likely to be relatively widespread in the central and northern Sierra Nevada, the Southern Cascades, and Klamath Province of California and adjacent Oregon.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Typically a westside association, the stands around Mammoth Mountain on the east side of the crest substantiate the more mesic local climate of this eastern Sierra Nevada setting.

Plots used to describe association (n=10)

USGS-NPS Veg Data: 98K104

Wieslander: 447, 703, 495, 10, 64, 67, 84, 97, 351

***Prunus emarginata* Shrubland [Provisional]**

COMMON NAME	Bitter Cherry Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold deciduous Shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Temperate cold deciduous shrubland
ALLIANCE	<i>Prunus emarginata</i> Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Prunus emarginata* Shrubland are sampled in the mapping area of Yosemite and environs within the Mammoth Lakes, Tenaya Lake, and Mount Dana 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Prunus emarginata* Shrubland are found at midelevations (5,900–8,200 feet) on gentle to somewhat steep slopes (5–24 degrees). This association is found on soils with textures ranging from sand to silt loam derived from granitic parent material. Litter cover at these sites can be high (40–70%).

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Prunus emarginata*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Prunus emarginata*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Prunus emarginata* Shrubland form a continuous shrub layer dominated by *Prunus emarginata*. *Populus tremuloides* is occasionally present in the overstory. *Prunus andersonii* can be common in the shrub layer. The shrub layer may also consist of low amounts of *Artemisia tridentata*, *Ribes roezlii*, *Purshia tridentata*, *Cercocarpus ledifolius*, and *Symphoricarpos rotundifolius* var. *rotundifolius*. The herbaceous layer may include *Lupinus latifolius*, *Apocynum androsaemifolium*, *Elymus elymoides*, *Gayophytum ramosissimum*, *Castilleja applegatei*, *Carex exserta*, *Carex hoodii*, and *Holodiscus discolor*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably the least widespread of the "montane chaparral or scrubs" in the Sierra Nevada. This association may also occur in the Klamath Mountains and the adjacent high north coast ranges.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association is generally more common on the west side of the Sierra Crest; however, stands do occur near the Mammoth Mountain area and perhaps in other parts of the eastern Sierra Nevada.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K105, 98M104, 98M47

***Chrysolepis sempervirens* Shrubland**

COMMON NAME

Sierran Chinquapin Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Evergreen shrubland

PHYSIOGNOMIC GROUP

Temperate broad-leaved evergreen shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE

Chrysolepis sempervirens Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Although the alliance occurs in the mountains of Oregon and California, this association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is common in Yosemite and environs. It may occur on both the west and the east sides of the crest but is most prevalent on the west side in Zone III.

ENVIRONMENTAL DESCRIPTION

Globally

This association is described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association is found from approximately 6,000–8,600 feet in elevation. It occurs primarily in low or midslope positions, in boulder fields, near outcrops, and on glaciated surfaces on moderate to somewhat steep slopes with variable aspects. Soil textures are stony loamy sands through silty loams, derived from granite, are

moderately well drained to well drained. Litter/Duff cover ranges from 20–80 percent, and averages 48 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Chrysolepis sempervirens*

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Chrysolepis sempervirens*

VEGETATION DESCRIPTION

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is characterized by a high shrub cover dominated by *Chrysolepis sempervirens*. Tree species include *Abies magnifica*, *Abies concolor*, and *Calocedrus decurrens*, but they are infrequent and have low cover. Shrub cover ranges from 60–90 percent, with the dominant, *Chrysolepis sempervirens*, averaging 49 percent cover. Other shrub species may include *Prunus emarginata*, *Arctostaphylos patula*, and *Quercus vaccinifolia*; however, none are frequent or have high average cover. Cover of herbaceous species averages 5 percent. No herb species are consistent, but stands may include *Pteridium aquilinum*, *Apocynum androsaemifolium*, and *Erigeron breweri*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION At this time only known from Yosemite; however, suspected of being in Sequoia and Kings Canyon national parks and other areas of the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

The seral status of this scrub is unclear relative to red fir and other coniferous species invasion. It is likely that this association is intermittent in moisture requirements between the *Ceanothus cordulatus* and *Prunus emarginata* associations on the mesic side and *Quercus vaccinifolia* and *Arctostaphylos patula* associations on the xeric side of the moisture gradient.

Plots used to describe association (n=7)

USGS–NPS Veg Data: 98K60, 99S166, 98K126, 99K116, 99S116

Wieslander: **243, 294**

FOREST AND WOODLAND ASSOCIATIONS OF ECOLOGICAL ZONE III

***Populus tremuloides*/Veratrum californicum Forest**

COMMON NAME	Quaking Aspen/California False Hellebore Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest
PHYSIOGNOMIC GROUP	Cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Montane or boreal cold deciduous forest
 ALLIANCE	 <i>Populus tremuloides</i> Forest Alliance
 CLASSIFICATION CONFIDENCE LEVEL	 1
 USFWS WETLAND SYSTEM	 Upland

RANGE

Globally

This association is known from the Sierra Nevada, particularly on the west side of the range. It is the typical aspen association of the meadow edges on the west side of the crest. These stands are usually surrounded by Zone III conifer forests and occur adjacent to meadows.

Yosemite and environs

Stands of this association are scattered throughout the montane regions of the park and environs, particularly on the west side of the crest, but may occur on the east side as in Lundy Canyon.

ENVIRONMENTAL DESCRIPTION

Globally

This association is usually considered a low lying meadow edge type with most stands occurring between 6,500 and 8,000 feet. Aspects are varied and not significant in distinguishing this type, and slopes are gentle to flat. Stands lie on the lower third of slopes or bottoms and are often part of meadow or riparian complexes. There is abundant moisture available in these sites.

Yosemite and environs

This association is found on gentle lower slopes, toe slopes, benches, and basins from 6,000–8,500 feet of elevation. Sites have ample soil moisture. Aspects are varied.

MOST ABUNDANT SPECIES

Globally

This association has been described from the central and southern Sierra Nevada (Potter, 1998).

Tree:	<i>Populus tremuloides</i>
Shrub:	
Herb:	<i>Osmorhiza chilensis</i> , <i>Elymus glaucus</i>

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Symphoricarpos acutus</i>
Herbaceous	<i>Osmorhiza berteroi</i> , <i>Elymus glaucus</i>

CHARACTERISTIC SPECIES

Globally

Tree *Populus tremuloides*
Shrub *Ribes roezlii*
Herbaceous *Veratrum californicum*, *Elymus glaucus*

Yosemite and environs

Tree *Populus tremuloides*
Shrub *Symphoricarpos acutus*
Herbaceous *Veratrum californicum*, *Elymus glaucus*

VEGETATION DESCRIPTION

Globally

Stands are usually mixed hardwood and conifer forests with aspen mixing with *Abies concolor* and *Abies magnifica*. Occasionally *Pinus contorta* is present. Shrubs are generally unimportant, but the herb layer is well developed accounting for an average of about 50 percent cover (forbs and graminoids combined). (Potter, 1998).

Yosemite and environs

This association is a mixed hardwood–conifer forest with high forb and graminoid cover. The tree canopy is dominated by *Populus tremuloides* (25% cover), mixed with one or more conifer species. These species may include *Pinus contorta* (20% cover), *Abies concolor* (10% cover), and/or *Abies magnifica* (10% cover). *Populus tremuloides* often forms a middle layer beneath a scattered upper layer of conifers, but in older stands it is part of the upper canopy as well. The shrub layer is typically sparse in this association. Understories contain a large variety of moist site indicators such as *Veratrum californicum* (2% cover), *Solidago canadensis* (1% cover), *Osmorhiza berteroi* (2% cover), and/or *Lupinus latifolius* (2% cover). Typical graminoids present may include *Elymus glaucus* (10% cover), *Carex utriculata* (2% cover), *Agrostis scabra* (1% cover), and/or *Deschampsia caespitosa* (0.5% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2

RANK JUSTIFICATION This is likely to be a threatened type outside protected areas due to improper grazing and altered fire regimes (see comments below).

DATABASE CODE To be determined

COMMENTS

Globally

This association appears to be similar to *Populus tremuloides/Veratrum californicum* Forest (CEGL000621).

Yosemite and environs

Stands in this association in Yosemite and elsewhere in the Sierra Nevada are trending toward dominance by conifers (largely *Abies concolor* or *Abies magnifica*). This trend is largely the result of grazing eliminating the resprouts of the aspen and lack of frequent fire resulting in the unrestricted regeneration of conifers (Potter, 1998).

Plots used to describe association (n=8)

USGS–NPS Veg Data: 99S106, 98K115, 99S167, 99K128

NRI: 18, 19, 37

Wieslander: 712

Potter (1998) 16 plots outside study area

***Abies concolor*-*Pinus lambertiana*/*Ceanothus cordulatus* Forest**

COMMON NAME	White Fir- Sugar Pine/Mountain Whitethorn Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Abies concolor*-*Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Abies concolor*-*Pinus lambertiana*/*Ceanothus cordulatus* Forest are sampled in the midelevation western portions of the mapping area of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Abies concolor*-*Pinus lambertiana*/*Ceanothus cordulatus* Forest are found at midelevations (6,300–6,800 feet) on variable aspects (northeast to west) on gentle to somewhat steep slopes (3–20 degrees). These sites are generally found on moderately developed soils with soil textures that range from stony to loamy, however, tending toward sandy loam. Soils are well drained to poorly drained, and soil depths are shallow to deep. Parent material is granite. It is likely that most if not all of these stands have experienced recent fire or other processes that enable the understory shrub layer of *C. cordulatus* to develop.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Abies concolor*, *Pinus lambertiana*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Abies concolor*, *Pinus lambertiana*
Shrub *Ceanothus cordulatus*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Abies concolor*/*Ceanothus cordulatus* Forest form an open to moderately continuous tree layer dominated by *Abies concolor* in the overstory tree layer. *Pinus lambertiana* is also characteristic but is less than 5 percent cover. *Pinus jeffreyi* is often a minor component in the tree canopy. *Abies magnifica* is occasionally present. A discontinuous shrub layer is dominated by *Ceanothus cordulatus*. Other shrubs present may include *Chrysolepis sempervirens*, *Symphoricarpos mollis*, *Symphoricarpos rotundifolius*, *Prunus emarginata*, and *Ribes* sp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Because sample plots in this association have a high relative cover of white fir compared to sugar pine, the decision was to initially put this association in the white fir alliance. However, these stands all do have a presence of sugar pine and thus have been moved to the white fir - sugar pine alliance.

Plots used to describe association (n=4)

Wieslander: **580, 303, 200, 56**

Abies concolor-*Pinus lambertiana*-*Pinus jeffreyi* Forest

COMMON NAME

White Fir- Sugar Pine-Jeffrey Pine Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies concolor-*Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Similar stands have been observed elsewhere in the southern Sierra Nevada and in the Peninsular Ranges of California, but not sampled quantitatively (see note below).

Yosemite and environs

Stands of *Abies concolor*-*Pinus lambertiana*-*Pinus jeffreyi* Forest are sampled in the mid-elevation western portions of the mapping area of Yosemite.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. Other similar stands occupy similar environments on granitic mountain slopes in California.

Yosemite and environs

Stands of *Abies concolor*-*Pinus lambertiana*-*Pinus jeffreyi* Forest are found at midelevations (5,800–8,300 feet, mean 6,724 feet) on variable aspects (north to southwest). The highest elevation stands generally occur on southerly or southwesterly facing slopes. Stands occur on flat, gentle to somewhat steep slopes (0–35 degrees, mean 12 degrees). These sites are generally found on soils ranging from shallow to deep, tending toward moderate depth. Soils are generally well drained. Parent material is granite.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i> , <i>Pinus jeffreyi</i>
Shrub	<i>Ceanothus cordulatus</i> , <i>Arctostaphylos patula</i>

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i> , <i>Pinus jeffreyi</i>
Shrub	none

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Abies concolor* *Pinus lambertiana*-*Pinus jeffreyi* Forest form a moderately continuous tree layer dominated by *Pinus lambertiana* in the overstory tree layer (averaging 51% cover). *Abies concolor* is a constant, but tends to be in somewhat lower cover (average 25 percent) *Pinus jeffreyi* is also characteristic and averages a similar 28 percent cover. All other tree species are found in less than 40 percent of the stands and include in order of decreasing frequency;

Calocedrus decurrens, *Abies magnifica*, *Pinus ponderosa*, *Quercus kelloggii*, and *Q. chrysolepis*. A discontinuous shrub layer is dominated by *Ceanothus cordulatus* and *Arctostaphylos patula*, both averaging between 13 and 25 percent cover. Other shrubs present may include *Chrysolepis sempervirens*, *Prunus emarginata*, *Arctostaphylos nevadensis*, *Chrysolepis sempervirens* and *Rosa spithamea*, all averaging less than 10% cover and with less than 30 percent frequency.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4S4

RANK JUSTIFICATION Despite being only defined from Yosemite it is likely that this association occurs in similar areas along most of the west slope of the Sierra

DATABASE CODE To be determined

COMMENTS

Globally

Similar stands have been observed elsewhere in the southern Sierra Nevada between Yosemite and Sequoia National Park. Similar stands also occur in southern California mountains as far south as the San Jacinto Range (Riverside Co.). It remains to be seen if these stands are classifiable as the same association.

Yosemite and environs

Sample plots in this association have a high relative cover of sugar pine over white fir , but were all sampled in the 1930s. Re-sampling of stands may suggest that white fir has increased cover.

Plots used to describe association (n=18)

Wieslander: 637, 639, 174, 448, 479, 641, 723, 749, 774, 733, 772, 316, 170, 154, 489, 460, 355, 160

Abies concolor - *Pinus lambertiana* - *Abies magnifica* Forest

COMMON NAME	White Fir - Sugar Pine - Red Fir Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Abies magnifica</i> - <i>Abies concolor</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

Abies concolor - *Pinus lambertiana* - *Abies magnifica* Forest is widespread at lower elevations on the west side of the upper montane of the central and southern Sierra Nevada, California. Stands can be quite extensive but mostly small, covering less than 50 acres in most cases (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Elevations generally lie between 5,800–7,900 feet in elevation but typically below 7,500 feet. Aspects are variable. Stands are usually on middle and lower slope positions. Sites have significantly less surface gravel and a deeper litter layer than most other types. Soils are usually formed in place on granitic bedrock, but some form on colluvium or glacial till. In general, soils are deep and are typically sandy loams or loams and rarely sands. The average water-holding capacity is generally moderate. Soils are typically well drained (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 6,300–7,400 feet in elevation on gentle to somewhat steep slopes, although mostly on moderate slopes. Aspects are variable, although primarily northwest, southwest, and south. Soils are derived from granite and have textures ranging from stony to sandy loams. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree *Abies concolor*, *Pinus lambertiana*, *Abies magnifica*

Yosemite and environs

Tree *Abies concolor*, *Pinus lambertiana*, *Abies magnifica*

CHARACTERISTIC SPECIES

Globally

Tree *Abies concolor*, *Pinus lambertiana*, *Abies magnifica*

Yosemite and environs

Tree *Abies concolor*, *Pinus lambertiana*, *Abies magnifica*

VEGETATION DESCRIPTION

Globally

Stands in this association are dense multilayered forests with a moderate cover of understory shrubs and herbs. Tree cover averages 76 percent. These stands are often adjacent to and interspersed with *Abies magnifica* - *Abies concolor* Forest and *Abies magnifica* - *Abies concolor* - *Pinus jeffreyi* Forest on mesic sites. A mix of several species with *Abies magnifica* distinguishes the overstory, but *Abies concolor* and *Abies magnifica* generally dominate, with 33 percent and 32 percent average cover, respectively. *Pinus lambertiana* is characteristically present, with an average 21 percent cover, but it occurs as widely scattered dominants. *Pinus jeffreyi* and *Calocedrus decurrens* are occasional members of these stands. Shrub cover ranges from 5–25 percent, typically occurring in patches or as individual shrubs. *Chrysolepis sempervirens* is the most common shrub, with a 67 percent frequency and 10 percent cover. Other shrubs may include *Symphoricarpos acutus* or *Ribes roezlii*. Herb cover averages 74 percent, but no single species is frequent or provides significant cover. *Pyrola picta*, *Kelloggia galioides*, *Hieracium albiflorum*, and *Pteridium aquilinum* are the most commonly encountered species.

Yosemite and environs

In Yosemite and environs, this association is characterized by an average of greater than 5 percent cover each of *Abies concolor*, *Pinus lambertiana*, and *Abies magnifica*. Mature trees may be over 50 meters in height. Stands are typically mixed-aged with saplings and pole trees of these conifers in the understory. Shrub cover is generally less than 5 percent, and no species is frequent. Shrubs may include *Arctostaphylos nevadensis*, *Ceanothus cordulatus*, *Ribes roezlii*, and

Chrysopsis sempervirens. Herb cover is also low, and no one species is frequent. Some of the more common herbaceous species are *Apocynum androsaemifolium*, *Hieracium albiflorum*, and *Pteridium aquilinum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION This association represents productive sites in the mid montane zone most of which have been disturbed and altered by timber harvest practices outside of protected areas.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=15)

USGS–NPS Veg Data: 98K59

NRI: 323, 338, 342, 343, 87, 89, 104, 120

Wieslander: 179, 731, 546, 302, 177, 286

***Abies concolor* - *Pinus lambertiana* Forest**

COMMON NAME

White Fir - Sugar Pine Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies concolor - *Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory. Potter (pers com 2002) suggests this forest ranges throughout the central and southern Sierra Nevada all the way to the Piute Mountains of Kern County. Similar stands have also been observed in the San Jacinto Mountains in Riverside County (Keeler–Wolf 1990).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association is found between 5,000–7,300 feet in elevation. Typically, stands are on moderate to somewhat steep slopes, although slopes range from flat to steep. Aspects are variable, but most are north, northwest, west, or southwest. Soil depth is also variable but is generally deep, with textures ranging from gravelly sand to sandy loam. Soils are derived from granitic bedrock. Sites are upland.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Abies concolor*, *Pinus lambertiana*

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Abies concolor*, *Pinus lambertiana*

VEGETATION DESCRIPTION

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is characterized by a dense canopy dominated by *Abies concolor* and *Pinus lambertiana*. *Pinus ponderosa*, *Quercus kelloggii*, and *Pinus jeffreyi* may also be present. *Abies concolor* is generally represented by sapling, pole, and mature trees, while the other trees may only be present as mature trees. The shrub layer is generally absent, but shrubs that may be present include *Chamaebatia foliolosa*, *Ceanothus cordulatus*, and *Arctostaphylos patula*. The herb layer is sparse, and the herbaceous species are variable.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION At this time, this association is only known from Yosemite; however, it is suspected of being in Sequoia and Kings Canyon national parks and other areas of the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is the generic version of the *Abies concolor* - *Pinus lambertiana* Forest Alliance. It has relatively dense canopy with no characteristic understory shrubs or herbs. It is most easily defined by what it does not contain (see other associations in this alliance).

Plots used to describe association (n=11)

Wieslander: 173, 278, 284, 296, 199, 428, 305, 306, 423, 424

Potter: 2022

***Abies concolor* - *Pinus lambertiana*/Maianthemum racemosum [Smilacina racemosa, Hickman 1993]- *Disporum hookeri* Forest**

COMMON NAME	White Fir - Sugar Pine/Solomon's Plume – Hooker's Fairybells Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Abies concolor* - *Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

The *Abies concolor* - *Pinus lambertiana* Forest Alliance occurs in mountains or foothill environments from southwestern Oregon to the Colorado Plateau and southern Stony Mountain regions. *Abies concolor* - *Pinus lambertiana*/Maianthemum racemosum – *Prosartes hookeri* Forest has been described from the northern Sierra Nevada and southern Cascade Ranges in California. Information about its global range is not available without additional inventory.

Yosemite and environs

This association appears to be uncommon in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

In the northern Sierra, elevations average 5,000 feet, and aspects are northeast, east, and northwest. Slopes range from gentle to steep. The association occurs in upper and midslope positions, and soils are gravelly sandy loams, sandy loams and loams, and are often derived from volcanic substrates.

Yosemite and environs

In Yosemite and environs, this association occurs between 6,800–7,300 feet. Aspects are variable, and slopes are moderate to steep. Soils are derived from granite and are loams.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies concolor</i>
Shrub	<i>Symphoricarpos mollis</i>
Herbaceous	<i>Maianthemum racemosum</i> , <i>Prosartes hookeri</i>

Yosemite and environs

Tree	<i>Abies concolor</i>
Herbaceous	<i>Abies concolor</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i>
Herbaceous	<i>Maianthemum racemosum</i> , <i>Prosartes hookeri</i>

Yosemite and environs

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i>
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Herbaceous *Abies concolor*, *Maianthemum racemosum* (Note: Wieslander plots have few to no herbaceous species identified.)

VEGETATION DESCRIPTION

Globally

Mature forests have a moderately dense to dense conifer overstory often codominated by variable mixtures of *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*, and *Pinus ponderosa*. *Abies concolor* averages 51 percent cover; the other conifers average 11–36 percent cover. The understory is sparse with *Maianthemum racemosum* (= *Smilacina racemosa*) and *Prosartes hookeri* (= *Disporum hookeri*) being most prevalent. *Chimaphila menziesii* is also a constant species.

Yosemite and environs

In Yosemite and environs, the tree layer consists primarily of *Abies concolor*, which averages 80 percent cover. Shrub cover is variable and may include *Abies concolor* saplings, *Ceanothus cordulatus*, and *Arctostaphylos patula*. The herb layer is predominantly seedling *Abies concolor*, but may include *Pterospora andromedea*. *Maianthemum racemosum* (= *Smilacina racemosa*) is a constant at less than 5 percent cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be relatively uncommon following extensive logging in these productive forests. In tact stands are almost entirely in protected areas such as wilderness and national parks.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association requires further definition in the Yosemite mapping area. It may prove to be somewhat different from the Fites (1994) description, which Potter (pers com 2002) believes does not occur south of the Molcolumne River. The herbaceous species indicative of this association are present in the Yosemite area but are relatively uncommon. With further sampling and analysis plots classified into this group locally may better be assigned to the *A. concolor*-*P. lambertiana*-*C. decurrens*/*Adenocaulor bicolor* association.

Plots used to describe association (n=4)

NRI: 135, 141, 279

Wieslander: 301

Abies concolor - *Calocedrus decurrens* - *Pinus lambertiana*/Corns *nuttallii*/Corylus *cornuta* Forest

COMMON NAME	White Fir – Incense Cedar - Sugar Pine/Pacific Dogwood/Beaked Hazelnut Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest

PHYSIOGNOMIC SUBCLASS Evergreen forest
PHYSIOGNOMIC GROUP Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Abies concolor* - *Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found between 5,800–6,200 feet on moderate to somewhat steep slopes, primarily on northern, northwestern, and western aspects. Soils are sandy loams of granitic origin.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*
Shrub *Cornus nuttallii*, *Corylus cornuta*

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*
Shrub *Cornus nuttallii*, *Corylus cornuta*

VEGETATION DESCRIPTION

Globally

This association is only known Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this is usually a mesic and dense forest with the tree layer composed of greater than 10 percent cover each of *Abies concolor*, *Calocedrus decurrens*, and *Pinus lambertiana* with an understory cover predominantly composed of *Cornus nuttallii* and *Corylus cornuta*, averaging 5 percent each. Information suggests that herb cover is sparse, but *Adenocaulon bicolor* is present in at least some of the stands.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

RANK JUSTIFICATION At this time only known from Yosemite, however, suspected of being in Sequoia and Kings Canyon national parks and other areas of the High Sierra Nevada. Unlogged stands are rare outside of protected areas.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association may be considered the higher elevation analog to the similar White fir - Sugar pine - Incense cedar/Trail plant Forest. A preliminary type, the White fir - Sugar pine/Pacific dogwood/Trail plant association (*Abies concolor* - *Pinus lambertiana*/*Cornus nuttallii*/*Adenocaulon bicolor*), has been lumped into this association. These stands are very similar to the *Sequoiadeondron giganteum*/*Pinus lamberrtiana*/*Cornus nuttallii* association with the notable absence of the big tree.

Plots used to describe association (n=6)

NRI: 119, 133

Wieslander: 257, 258, 539

Potter: 332

***Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Adenocaulon bicolor* Forest**

COMMON NAME	White Fir – Incense Cedar - Sugar Pine/Trail Plant Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Abies concolor</i> - <i>Pinus lambertiana</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

The association has been described from the northern Sierra Nevada and southern Cascade Ranges in California. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association occurs on cool, moist, gently sloping sites with well developed soils at elevations averaging 4,700 feet. Sites are north-, northeast-, and northwest-facing lower slopes, benches, or swales and are often associated with headwater areas or seasonal streams. Substrates are variable (Fites 1994).

Yosemite and environs

In Yosemite and environs, this association occurs on all slope positions at elevations from 4,300–5,700 feet on gentle to steep slopes. Aspects are variable but are primarily eastern. Surface geology is variable, and soils are clay loams, loams, or sandy loams and range from somewhat poorly drained to well drained. Duff cover ranges from 7–90 percent.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies concolor</i> , <i>Calocedrus decurrens</i> , <i>Pinus lambertiana</i>
Herbaceous	<i>Adenocaulon bicolor</i>

Yosemite and environs

Tree	<i>Abies concolor</i> , <i>Calocedrus decurrens</i> , <i>Pinus lambertiana</i>
Herbaceous	<i>Adenocaulon bicolor</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies concolor</i> , <i>Calocedrus decurrens</i> , <i>Pinus lambertiana</i>
Herbaceous	<i>Adenocaulon bicolor</i>

Yosemite and environs

Tree	<i>Abies concolor</i> , <i>Calocedrus decurrens</i> , <i>Pinus lambertiana</i>
Herbaceous	<i>Adenocaulon bicolor</i>

VEGETATION DESCRIPTION

Globally

This is a late successional forest characterized by dense, several layered conifer overstory and an herb layer dominated by *Adenocaulon bicolor*. *Abies concolor*, *Calocedrus decurrens*, and frequently *Pseudotsuga menziesii* codominate all layers of the diverse overstory. *Pinus lambertiana* is consistently a minor associate. *Pinus ponderosa* sometimes occurs in low amounts. Regeneration is dominated by *Abies concolor* and *Calocedrus decurrens*, but *Pseudotsuga menziesii* and *Pinus lambertiana* are frequent in low amounts. The shrub layer is variable with no shrubs or variable amounts of *Symphoricarpos mollis*. *Adenocaulon bicolor* dominates the usually well developed herb layer, indicating moist soils. Other herbs include *Maianthemum racemosum* (= *Smilacina racemosa*), *Osmorhiza berteroi* (= *Osmorhiza chilensis*), *Galium triflorum*, and *Prosartes hookeri* (= *Disporum hookeri*).

Yosemite and environs

In Yosemite and environs, the multilayered tree canopy is composed primarily of *Abies concolor*, *Calocedrus decurrens*, and *Pinus lambertiana*, averaging 25 percent, 5 percent, and 21 percent of the cover, respectively, and ranging from 10 to over 50 meters in height. *Cornus nuttallii* and *Quercus kelloggii* provide a very small amount of cover in the tree layer. The shrub layer is variable, ranging from less than 5 to 25 percent cover. *Adenocaulon bicolor* is the most prevalent herb species, averaging 5% cover. Other species in the herb layer, which range from 5 to over 50 percent cover, include *Goodyera oblongifolia*, *Galium triflorum*, and seedlings or sprouts of *Quercus kelloggii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION At this time only known from Yosemite, however, suspected of being in Sequoia and Kings Canyon national parks and other areas of the High Sierra Nevada. This is likely to be a type heavily impacted by logging over the past 100 years.

DATABASE CODE To be determined

COMMENTS

Globally

Potter (pers com 2002) has 42 plots in similar stands from recent sampling in Sierra Nevada. However, almost all are in *Sequoiadendron giganteum* dominated communities and would be considered part of that alliance in this report.

Yosemite and environs

The lower elevation analog of *Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Cornus nuttallii*/*Corylus cornuta* Forest.

Plots used to describe association (n=7)

USGS-NPS Veg Data: 98K19, 99S105, 99S134, 98M69

NRI: 115, 117, 222

***Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Chrysolepis sempervirens* Forest**

COMMON NAME

White Fir- Incense Cedar - Sugar Pine/Sierran Chinquapin Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies concolor – *Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is found in the northern Sierra Nevada and southern Cascade Mountains (Fites 1994).

Yosemite and environs

Stands of *Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Chrysolepis sempervirens* Forest are sampled in the mapping area of Yosemite and environs within the Mariposa Grove 7.5-minute, El Capitan, and Ackerson Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only found at midelevations (4,800–6,200 feet) in the northern Sierra Nevada and southern Cascade Mountains. Sites are usually on mid slopes (range from lower to upper slopes) with variable aspects (east to northwest). Soils are moderately deep to deep from volcanic and granitic parent materials. Coarse fragments are variable but often high. Fire regime is variable due to topographic position (Fites 1994).

Yosemite and environs

Stands of *Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Chrysolepis sempervirens* Forest are found at midelevations (5,800–6,900 feet) on moderate to steep (10–29 degrees) slopes. These stands are found on all aspects but are often on west-facing slopes. Soils are moderately well developed with soil textures ranging from sand to loam, tending toward loams. Soils are moderately well drained to well drained. The parent material is granitic. Fire is common in this association.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i> , <i>Calocedrus decurrens</i> , <i>Pinus ponderosa</i> (Fites 1994)
Shrub	<i>Chrysolepis sempervirens</i>

Yosemite and environs

Tree	<i>Abies concolor</i>
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CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i> , <i>Calocedrus decurrens</i> , <i>Pinus ponderosa</i> , <i>Pseudotsuga menziesii</i> (Fites 1994)
Shrub	<i>Chrysolepis sempervirens</i>

Yosemite and environs

Tree	<i>Abies concolor</i> , <i>Pinus lambertiana</i> , <i>Calocedrus decurrens</i>
Shrub	<i>Chrysolepis sempervirens</i>

VEGETATION DESCRIPTION

Globally

This association is dominated by *Abies concolor* in the continuous tree layer and *Chrysolepis sempervirens* in the open shrub layer. *Calocedrus decurrens* is a consistent minor component. *Pinus lambertiana*, *Pinus ponderosa*, *Pseudotsuga menziesii*, and *Pinus jeffreyi* are often present in low amounts. Shrub cover is higher in openings in the stands. *Chrysolepis sempervirens* is dominant and *Symphoricarpos mollis* is often present in low amounts. The sparse herb layer includes *Chorizanthe membranacea*, *Carex rossii*, *Carex multicaulis*, *Pyrola picta*, and *Chimaphila umbellata* (Fites 1994).

Yosemite and environs

Abies concolor - *Calocedrus decurrens* - *Pinus lambertiana*/*Chrysolepis sempervirens* Forest is characterized by *Abies concolor*, *Pinus lambertiana*, and *Calocedrus decurrens* in the overstory tree layer and *Chrysolepis sempervirens* in the shrub layer. Occasionally, *Pinus ponderosa* is also present in the overstory. *Ceanothus cordulatus* is often in the shrub layer and *Arctostaphylos patula* is a common shrub at some sites. Other shrub species that may be found contributing to minor cover include *Corylus cornuta* and *Ceanothus integerrimus*. The herbaceous layer is generally sparse and may include *Adenocaulon bicolor*, *Pyrola picta*, and a variety of other species contributing to minor cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably was widespread in the west side forests of the Sierra Nevada, but old growth stands are rare now.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Pseudotsuga menziesii is not typically a component in the local stands. However, the association is so similar in other respects to the one described by Fites (1994) in the northern Sierra that we are assuming these are synonymous.

Plots used to describe association locally (n=13)

NRI: 91, 327, 325, 326, 92, 98

Wieslander: 661, 635, 313, 298, 34, 660, 443

Fites (1994): 10 plots (northern Sierra Nevada)

***Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/Symphoricarpos mollis/Kelloggia galioides Forest**

COMMON NAME

**White Fir – Incense Cedar - Sugar Pine/Creeping Snowberry/Milky
Kelloggia Forest**

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies concolor - *Pinus lambertiana* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is found in the northern Sierra Nevada and southern Cascade Mountains (Fites 1994).

Yosemite and environs

Stands of *Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/Symphoricarpos mollis/Kelloggia galioides Forest are sampled in the mapping area of Yosemite and environs within the Lake Eleanor 7.5-minute and Lake Eleanor 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is found at midelevations (3,800–6,300 feet) on gentle, upper to midslopes of varied aspects. Soils are moderately deep to deep from granitic or volcanic parent materials. Stand size is variable but often occupies large areas in the landscape (Fites 1994).

Yosemite and environs

Stands of *Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Symphoricarpos mollis*/*Kelloggia galioides* Forest are found at low to midelevations (4,600–6,700 feet) on gentle to steep (1–32 degrees) slopes. Aspect varies (northeast to northwest) but is often northwestern. Parent material is typically granitic, and sites are somewhat stony. Fire evidence is common at these sites.

MOST ABUNDANT SPECIES

Globally

Tree *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*, *Pinus ponderosa*, *Pinus jeffreyi*

Yosemite and environs

Tree *Abies concolor*

CHARACTERISTIC SPECIES

Globally

Tree *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*, *Pinus ponderosa*, *Pinus jeffreyi*

Shrub *Symphoricarpos mollis*

Herbaceous *Kelloggia galioides*

Yosemite and environs

Tree *Abies concolor*, *Calocedrus decurrens*, *Pinus lambertiana*

Shrub *Symphoricarpos mollis*

Herbaceous *Kelloggia galioides*

VEGETATION DESCRIPTION

Globally

This association forms a dense overstory dominated by *Abies concolor*. *Pinus lambertiana* and *Calocedrus decurrens* are consistent minor associates. *Pinus ponderosa* and *Pinus jeffreyi* are often present in varying amounts. *Pseudotsuga menziesii* and *Quercus kelloggii* are occasionally present. The usually sparse understory shrub layer is scattered with *Symphoricarpos mollis*. *Kelloggia galioides* and *Hieracium albiflorum* are present in low amounts (Fites 1994).

Yosemite and environs

Stands of *Abies concolor* - *Calocedrus decurrens* - *Pinus lambertiana*/*Symphoricarpos mollis*/*Kelloggia galioides* Forest are dominated by *Abies concolor* in the overstory layer. *Calocedrus decurrens* and *Pinus lambertiana* are also characteristic but less abundant. *Pinus jeffreyi* and *Quercus kelloggii* are common at some stands. *Pinus ponderosa* is occasionally present in some stands. Rarely, *Pseudotsuga menziesii* is present at lower elevations. The shrub layer is very open and is dominated by *Symphoricarpos mollis*. Other shrubs that may also contribute to minor cover include *Ceanothus integerrimus*, *Ceanothus cordulatus*, and *Chamaebatia foliolosa*. The herb layer is open and includes *Osmorhiza berteroi* (= *Osmorhiza chilensis*), *Galium bolanderi*, *Galium sparsiflorum*, *Hieracium albiflorum*, *Apocynum androsaemifolium*, and *Collomia grandiflora*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

As locally represented, this association does not have *Kelloggia galioides* in high constancy. However, all other aspects of this and the Fites (1994) association are identical. We are assuming, therefore, that the two are synonymous.

Plots used to describe association locally (n=7)

NRI: 88, 105, 116, 263, 314, 322

Wieslander: **663**

Fites (1994): 11 plots (northern Sierra Nevada)

***Abies magnifica*/Wyethia mollis Forest**

COMMON NAME

Red Fir/Woolly Mule's-ears Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies magnifica Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Abies magnifica/Wyethia mollis Forest is found at the Eldorado and Stanislaus national forests and the Lake Tahoe Basin Management Unit, and it has been observed on the Toiyabe National Forest (Potter, 1998).

Yosemite and environs

Occurs locally on volcanics north of Cherry Lake.

ENVIRONMENTAL DESCRIPTION

Globally

Abies magnifica/Wyethia mollis Forest is found at mid to high elevations (6,900–8,300 feet) on gentle to somewhat steep slopes (5–38%). They are usually on southeast- and southwest-facing slopes and on ridges and upper slopes where microrelief is uniform. Soils are derived from volcanic parent material with surface textures of sandy loam to loam and subsurface texture of loams, sandy clay loams, and clay loams. Soil depths are 15–40 inches (Potter, 1998).

Yosemite and environs

See Potter (1998) descriptions.

MOST ABUNDANT SPECIES

Globally

Tree

Abies magnifica, *Pinus jeffreyi* (Potter, 1998)

Herbaceous

Wyethia mollis (Potter, 1998)

Yosemite and environs

See Potter (1998) descriptions.

CHARACTERISTIC SPECIES

Globally

Tree *Abies magnifica*, *Pinus jeffreyi* (Potter, 1998)
Herbaceous *Wyethia mollis* (Potter, 1998)

Yosemite and environs

See Potter (1998) descriptions.

VEGETATION DESCRIPTION

Globally

Abies magnifica/*Wyethia mollis* Forest represents typically intermittent woodlands dominated by *Abies magnifica* and *Pinus jeffreyi*. Tree distribution is characteristically patchy. *Pinus contorta* and *Pinus monticola* occasionally contribute to low cover. Shrub cover is low with *Symphoricarpos mollis* appearing occasionally. The intermittent understory is dominated by *Wyethia mollis*, *Monardella odoratissima* ssp. *pallida*, and *Elymus elymoides* ssp. *elymoides*. Other herb species include *Collinsia torreyi* var. *wrightii*, *Erysimum capitatum* var. *perenne* (= *Erysimum perenne*), *Gayophytum eriospermum*, *Lupinus andersonii*, and *Sidalcea glaucescens* (Potter, 1998).

Yosemite and environs

See Potter (1998) descriptions.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably restricted to the volcanic mudflows of the northern and central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Although there are no samples locally, this distinctive association has been verified visually from the northern portion on volcanic lahars.

Plots used to describe association (n=0)

Potter (1998): 14 samples

***Abies magnifica* - *Pinus monticola*/*Chrysolepis sempervirens* Forest**

COMMON NAME

Red Fir - Western White Pine/Sierran Chinquapin Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies magnifica Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Abies magnifica - *Pinus monticola*/*Chrysolepis sempervirens* Forest is located at higher elevations primarily in the southern and eastern portions of the upper montane in the central and southern Sierra Nevada, California. Yosemite may be near the northern limit of its range. Stand size is usually small, often covering less than an acre on small rock outcrops, but sometimes covering more than 50 acres.

Yosemite and environs

This association is moderately common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association typically occurs above 8,000 feet with many stands occurring over 8,500 feet in elevation. Aspects are predominantly northeast and northwest, and the majority of stands are located on upper and middle slopes that are somewhat steep or steeper. Soils are generally derived from granite but may be volcanic or metamorphic in origin and may have evolved in place or formed from alluvium. Soils are typically shallower than most forested sites in the upper montane of the Sierra Nevada. The texture is sand or sandy loam, and the soils are usually excessively drained (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 8,300–8,900 feet in elevation on moderate to steep slopes or on the top of granite knobs. Aspects are variable but primarily northern and western. Soils are derived from granite and have textures ranging from stony, gravelly sands to loams and are well drained. Bare soil ranges from 30–60 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Chrysolepis sempervirens</i>
Herbaceous	<i>Arabis platysperma</i> , <i>Achnatherum occidentale</i>

Yosemite and environs

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
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CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Chrysolepis sempervirens</i>

Yosemite and environs

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Chrysolepis sempervirens</i>

VEGETATION DESCRIPTION

Globally

Stands are open woodlands with a prominent shrub understory. Overstory composition is characterized by *Pinus monticola* mixed with *Abies magnifica* for a tree cover averaging 51 percent. In some stands, *Pinus monticola* may reach 50 percent cover, but in most cases *Abies magnifica* is the dominant species. Shrub cover averages 29 percent with *Chrysolepis sempervirens* as the dominant species. In some cases *Arctostaphylos patula* is present in substantial amounts, and stands take on the appearance of a mixed shrub plant community. These two shrubs indicate the dry conditions of these stands. The herb layer averages less than 10 percent cover and is composed of widely scattered *Arabis platysperma*, *Penstemon caesius*, *Pyrola picta*, and *Erysimum capitatum* var. *perenne* (= *Erysimum perenne*).

Yosemite and environs

In Yosemite and environs, this association has an open tree canopy ranging from 10 meters to over 50 meters in height and dominated by *Abies magnifica*, which has an average cover of 35 percent. *Pinus monticola* cover averages 5 percent. *Juniperus occidentalis* and *Tsuga mertensiana* may be present in low numbers. The shrub layer ranges from 5–30 percent cover, and its composition is variable with *Chrysolepis sempervirens*, *Artemisia rothrockii*, *Arctostaphylos patula*, and saplings and poles of *Abies magnifica* being the most common species in the shrub layer. The herb layer is also variable and ranges from 5–30 percent cover. Herb species include *Eucephalus breweri* (= *Aster breweri*), *Castilleja applegatei*, *Streptanthus tortuosus*, *Lupinus breweri*, and *Viola purpurea*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Probably restricted to small stands in the southern and central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=5)

USGS–NPS Veg Data: 98K70, 98K67

NRI: 331

Wieslander: 668, 338

Potter (1998): 11 samples

Abies magnifica - *Pinus monticola* Forest

COMMON NAME

Red Fir - Western White Pine Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies magnifica Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL

1

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Abies magnifica - *Pinus monticola* Forest is located at higher elevations throughout the central and southern Sierra Nevada, California. Stands can be somewhat extensive, but in most cases they appear to be less than 50 acres in size. It becomes more abundant south of Kaiser Pass (southern Sierra) where *Tsuga mertensiana* begins to lose abundance regionally (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association most frequently occurs above 8,500 feet in elevation. Aspects can be varied, but sites typically face northeast and northwest. Most stands are on slopes that are somewhat steep or less. This association occurs predominantly on ridges and upper and middle slope positions where microrelief is smooth and uniform. Soils are generally derived from granite, but parent materials may be volcanic, sedimentary, metamorphic, or mixed. Soils are moderately deep to deep, are commonly sandy loams, and are either well drained or excessively drained.

Yosemite and environs

In Yosemite and environs, this association occurs between 8,200–9,200 feet in elevation. It occurs on gentle to steep slopes, although mostly on moderate slopes. Aspects are variable but primarily north and northwest. Soils are derived from granite and have textures ranging from stony, gravelly sands to loams and are well drained. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree *Abies magnifica*, *Pinus monticola*

Yosemite and environs

Tree *Abies magnifica*, *Pinus monticola*

CHARACTERISTIC SPECIES

Globally

Tree *Abies magnifica*, *Pinus monticola*

Yosemite and environs

Tree *Abies magnifica*, *Pinus monticola*

VEGETATION DESCRIPTION

Globally

Stands are moderately dense forests with little understory vegetation. Tree cover is significantly higher than other stands with *Pinus monticola*. Overstory layers are characterized by the presence of *Pinus monticola* in a mix with *Abies magnifica*. In rare stands *Pinus monticola* may comprise nearly 50 percent of the crown cover, but generally red fir has the highest cover values. Understories are quite open. The shrub layer is essentially absent. The sparse forb component is distinguished by the presence of *Eucephalus breweri* (= *Chrysopsis breweri*) and *Arabis platysperma*, indicating dry sites. *Monardella odoratissima* and *Erysimum capitatum* var. *perenne* (= *Erysimum perenne*) are other herbs that may be present. Conifer regeneration is high, dominated by *Abies magnifica*.

Yosemite and environs

In Yosemite and environs, this association has an open tree canopy ranging from 10 meters up to 35 meters in height. It is dominated by *Abies magnifica* with an average cover of 35 percent, and *Pinus monticola* with cover averaging 26 percent. The shrub layer is generally absent. The herb layer is variable and generally totals less than 5 percent. Herb species may include *Phlox diffusa* and seedling *Abies magnifica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Generally restricted to the upper montane belt of the central and southern Sierra Nevada

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=25)

USGS-NPS Veg Data: 98MCHS2

NRI: 124, 353

Wieslander: 767, 752, 682, 686, 696, 604, 598, 485, 493, 515, 375, 367, 369, 340, 347, 363, 365, 244, 310, 78, 342

Potter: 2008

Potter (1998): 35 samples

Abies magnifica - *Pinus monticola*/*Arctostaphylos nevadensis* Forest

COMMON NAME

Red Fir - Western White Pine/Pinemat Manzanita Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies magnifica Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Abies magnifica - *Pinus monticola*/*Arctostaphylos nevadensis* Forest is located on both the east side and west side of the central and southern Sierra Nevada, California. Stand size is not large; however, some sites over 100 acres have been observed (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association typically occurs above 8,000 feet in elevation. Aspects are varied but predominantly southeastern and southwestern. Sites are mostly on ridges and upper and middle slope positions on sites with broken and varied microrelief. Slopes are moderate or somewhat steep. Soils are predominantly derived from granite and may form on bedrock or alluvium or glacial till. Soils are moderately deep; topsoils are shallow and are sands or sandy loams. They are well drained or excessively drained. The available water-holding capacity in these stands is significantly lower than on other sites, although rootable fractures in the bedrock supply additional sources of moisture. Bare ground and surface rock are both significantly higher than most other sites, while litter depths are significantly less (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 7,600–8,600 feet in elevation on moderate to steep slopes. Aspects are variable. Soils are derived from granite and have textures ranging from stony gravel to sandy loams and are moderately well drained. Bare soil ranges from 15–35 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Arctostaphylos nevadensis</i>

Yosemite and environs

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Arctostaphylos nevadensis</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Arctostaphylos nevadensis</i>

Yosemite and environs

Tree	<i>Abies magnifica</i> , <i>Pinus monticola</i>
Shrub	<i>Arctostaphylos nevadensis</i>

VEGETATION DESCRIPTION

Globally

Stands are open woodlands with an understory of *Arctostaphylos nevadensis*. Total vegetation cover is higher than other plant associations due to the high cover of this shrub; however, tree cover is lower than most types. Overstory composition is characterized by *Pinus monticola* mixed with *Abies magnifica* for a tree cover averaging 43 percent. Shrub cover averages 31 percent, with *Arctostaphylos nevadensis* as the dominant species and *Chrysolepis sempervirens* as an occasional component. The herb layer averages less than 5 percent cover and includes *Arabis platysperma*, *Elymus elymoides*, *Pedicularis semibarbata*, and *Achnatherum occidentale*.

Yosemite and environs

In Yosemite and environs, stands are open woods to 35 meters in height with a shrub understory. Both *Abies magnifica* and *Pinus monticola* cover average between 5 percent and 25 percent. The shrub layer is dominated by *Arctostaphylos nevadensis*, averaging 11 percent cover, but may also contain *Quercus vaccinifolia*. The herb layer is variable and averages less than 10 percent cover. It may include *Apocynum androsaemifolium*, *Arabis platysperma*, and *Erigeron breweri*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Widespread, though of limited extent throughout the upper elevations of the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=10)

USGS-NPS Veg Data: 99K112

NRI: 50, 226, 286

Wieslander: 761, 673, 674, 670, 456

Potter: 2009

Potter (1998): 30 plots outside study area

***Abies magnifica* - *Pinus monticola* - *Pinus contorta* var. *murrayana* Forest**

COMMON NAME	Red Fir - Western White Pine - Murray Lodgepole Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Abies magnifica* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Abies magnifica - *Pinus monticola* - *Pinus contorta* var. *murrayana* Forest is located on both the upper-elevation east side and west side of the central and southern Sierra Nevada, California. Most samples are located on the Inyo and the Toiyabe national forests but also occur at high elevations on the west side. Stand size can be extensive; most are under 100 acres (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association typically occurs above 8,500 feet in elevation. This is the highest elevation association of the mixed *Abies magnifica* and *Pinus monticola* associations. Aspects are varied but are predominantly northeast and northwest. Sites are mostly on ridges and upper and middle slope positions. Slopes are varied ranging from less than 20 percent to greater than 40 percent. Microrelief is variable. Soils are often derived from granite, but a significant number of stands

occur on volcanic soils and form on bedrock, alluvium, or glacial till. Soils are typically shallow and are sands or sandy loams. They are generally excessively drained. There is much exposed gravel at the surface. Stands often intermix with mountain hemlock, red fir, or lodgepole pine plant associations, where all three mark the transition into the subalpine forests of ecological Zone IV, above.

Yosemite and environs

In Yosemite and environs, this association occurs between 7,800–9,500 feet. Most aspects are northerly, ranging from west to east. Soils are derived from granite, have textures ranging from stony gravel to sandy loams, and are moderately well drained. Bare soil ranges from 15–35 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree *Abies magnifica*, *Pinus monticola*, *Pinus contorta* var. *murrayana*

Yosemite and environs

Tree *Abies magnifica*, *Pinus monticola*, *Pinus contorta* var. *murrayana*

CHARACTERISTIC SPECIES

Globally

Tree *Abies magnifica*, *Pinus monticola*, *Pinus contorta* var. *murrayana*

Yosemite and environs

Tree *Abies magnifica*, *Pinus monticola*, *Pinus contorta* var. *murrayana*

VEGETATION DESCRIPTION

Globally

Stands are moderately dense forests with sparse understories. Total vegetation cover is generally lower than other forests in the *Abies magnifica* alliance. Overstory composition is characterized by a mix of *Pinus monticola* (mean 16% cover) and *Pinus contorta* var. *murrayana* (mean 21% cover); *Abies magnifica* averages 33 percent cover. Tree cover averages about 63 percent (range 37–91%). Shrub cover is virtually nonexistent, averaging 1 percent (no characteristic species), although conifer regeneration is moderate to high. The herb layer averages about 12 percent cover and includes *Arabis platysperma*, *Carex rossii*, *Pedicularis semibarbata*, and *Achnatherum occidentale* as the principal species (Potter, 1998).

Yosemite and environs

In Yosemite and environs, stands are intermittent to continuous forests with an understory. *Abies magnifica* averages about 50 percent cover, *Pinus contorta* var. *murrayana* about 15 percent, and *Pinus monticola* cover about 12 percent. The shrub layer is very sparse. Only *Ribes montigenum*, *Quercus vaccinifolia*, *Arctostaphylos patula*, and *Chrysolepis sempervirens* are occasional, averaging less than 1 percent total. The herb layer is also sparse, averaging 1–2 percent and includes no characteristic species.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Likely to be widespread, though of limited extent throughout the upper elevations of the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=30)

NRI: 194, 195, 129, 130, 180, 337, 351, 59, 329

Wieslander: 746, 620, 601, 531, 527, 521, 381, 388 390, 370, 337, 318, 232, 220, 221, 211, 213, 107, 99, 9

Potter: 2006

Potter (1998): 24 plots outside study area

***Abies magnifica* Forest**

COMMON NAME

Red Fir Forest

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Abies magnifica Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Abies magnifica Forest is widespread in the central and southern Sierra Nevada in California. It begins to appear above *Abies concolor* - *Pinus lambertiana* communities at the upper edge of the lower montane. It becomes dominant in the upper montane, and it gradually diminishes into the subalpine zone above. Individual stands range from smaller than 5 acres to extensive tracts covering large areas. Usually, however, single stands are of moderate size with many occupying less than 100 acres (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association can occur at all elevations of the upper montane. Stands on the east side of the Sierra Nevada generally occur between 8,000–9,200 feet. Aspects are variable but often northeast and northwest. Slopes range from gentle to steep. Stands are located on all slope positions, except they seldom occur on ridge tops. Microrelief on most sites is smooth and uniform. Soils are derived primarily from granite with some volcanic in origin. Other parent materials are rare. Soils are significantly deeper than other sites and are usually sandy loams. Soils are typically well drained. This type has significantly lower levels of bare ground and surface gravel than most other sites, and litter cover and depth are significantly higher, reflecting the characteristic high levels of tree cover and debris on the forest floor (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 7,000–8,800 feet in elevation on gentle to somewhat steep (although primarily moderate) slopes. Aspects are highly variable. Soils are derived from granite, have textures ranging from stony gravel to loam, and are moderately well drained. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree *Abies magnifica*

Yosemite and environs

Tree *Abies magnifica*

CHARACTERISTIC SPECIES

Globally

Tree *Abies magnifica*

Yosemite and environs

Tree *Abies magnifica*

VEGETATION DESCRIPTION

Globally

Stands are characteristically dense multilayered forests with little ground cover. Total tree cover is one of the highest in the upper montane of the Sierra Nevada. The overstory is dominated by a single tree, *Abies magnifica*. Understories are sparse; shrub and herb layers are essentially absent. In rare cases, *Chrysolepis sempervirens*, *Arctostaphylos nevadensis*, *Quercus vaccinifolia*, and *Ceanothus cordulatus* may be present in substantial amounts to indicate drier sites. *Ceanothus cordulatus*, while infrequent, is important in the understory due to its ability to rapidly occupy disturbed sites. The herb layer may contain *Corallorhiza maculata*, *Pedicularis semibarbata*, *Phacelia hydrophylloides*, and *Pyrola picta*. *Abies magnifica* is the major regenerating species.

Yosemite and environs

In Yosemite and environs, stands are open woods to over 50 meters in height with very little understory. Cover of *Abies magnifica*, almost the sole tree species, averages 70 percent. The shrub layer is generally absent. The herb layer is highly variable and averages less than 10 percent cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4S4

RANK JUSTIFICATION This is probably the most extensive association in the *Abies magnifica* alliance.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=37)

USGS-NPS Veg Data: 98K68

NRI: 94, 96, 121, 142, 272, 285

Wieslander: 616, 618, 5, 657, 677, 678, 600, 602, 610, 548, 551, 562, 464, 484, 368, 343, 345, 312, 206, 222, 66, 185, 483, 494

Potter: 2012, 2013, 2016, 2017, 2002, 2010

Potter (1998): 160 plots outside study area

Abies magnifica/*Arctostaphylos nevadensis* Forest

COMMON NAME	Red Fir - Pinemat Manzanita Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Abies magnifica</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	1

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Abies magnifica/*Arctostaphylos nevadensis* Forest is widespread in the central and southern Sierra Nevada in California, but it appears to be primarily on the west side of the range. Stands can cover large acreages; however, in the majority of cases they are smaller than 10 acres (Potter, 1998). Similar stands defined as *Abies magnifica*/*Arctostaphylos nevadensis* (Imper 1988 in Sawyer and Keeler-Wolf 1995) have been described from Mt. Shasta in the southern Cascades.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association can occur at all elevations of the upper montane, from 7,000–8,800 feet. Aspects are variable. Slopes range from gentle to somewhat steep. Stands are located on all slope positions except toeslopes; however, they are typically found on ridge tops and upper and middle slopes. Litter depths are significantly less when compared to most other associations. Granitic parent materials are common, with volcanic and metamorphic substrates rare. Most soils are formed in place over bedrock and range from 25 to 40 inches deep. Topsoils are usually sandy loams with occasional sands and loams. Coarse fragment content in the subsoils is significantly higher than most other sites associated with this type. Soils are excessively drained. This association is closely related to *Abies magnifica* - *Pinus monticola*/*Arctostaphylos nevadensis* Forest vegetationally, but the environments, primarily elevation, coarse fragment content, and textures, differ enough that they are classified separately at this time. Sites are upland (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 6,800–8,000 feet in elevation on moderate to steep slopes. Aspects are primarily western. Soils are derived from granite and have textures ranging from stony, gravelly sand to loam. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies magnifica</i>
Shrub	<i>Arctostaphylos nevadensis</i>

Yosemite and environs

Tree	<i>Abies magnifica</i>
Shrub	<i>Arctostaphylos nevadensis</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies magnifica</i>
Shrub	<i>Arctostaphylos nevadensis</i>

Yosemite and environs

Tree	<i>Abies magnifica</i>
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VEGETATION DESCRIPTION

Globally

These stands are characteristically open woodlands with a distinctive low-shrub layer of *Arctostaphylos nevadensis*. Total vegetative cover is high due to the high cover of this shrub, but tree cover is significantly lower than most other types. Trees tend to occur as scattered clumps or individuals. The overstory is predominantly *Abies magnifica*, but occasional *Pinus jeffreyi* and *Abies concolor* are present, and *Pinus monticola* is rarely present as scattered individuals. Some stands in the association are actually dominated by *Pinus jeffreyi*, although *Abies magnifica* is typically important in these situations. The shrub layer is typified by *Arctostaphylos nevadensis*, but *Chrysolepis sempervirens* is also a somewhat consistent member of the association. The herb component is often sparse and contains a mix of dry and moderate site species. *Arabis platysperma* and *Monardella odoratissima* indicate drier conditions, while *Pyrola picta* and *Viola purpurea* indicate moister sites. *Abies magnifica* is the major regenerating species.

Yosemite and environs

In Yosemite and environs, the tree layer is almost solely *Abies magnifica* with relatively open cover between 15 and 50 percent, although *Pinus lambertiana* may occasionally provide a small percentage of the cover in this association. The shrub layer is variable and is composed of *Arctostaphylos nevadensis* averaging 3 percent cover, *Chrysolepis sempervirens* averaging 3 percent cover, *Quercus vaccinifolia* averaging 1 percent cover, and *Ceanothus cordulatus* averaging 2 percent cover. Information on the herb layer is not available.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This type may range into southern Oregon (J. Kagan pers. comm. 1996).

Yosemite and environs

A common and widespread association of the midelevations of the west side.

Plots used to describe association (n=5)

Wieslander: 590, 649, 651, 704, 592

Potter (1998): 28 plots outside study area

Abies magnifica - *Pinus contorta* var. *murrayana*/ *Hieracium albiflorum* Forest

COMMON NAME	Red Fir - Murray Lodgepole Pine/Whiteflower Hawkweed Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Abies magnifica</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	1
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

Abies magnifica - *Pinus contorta* var. *murrayana*/*Hieracium albiflorum* Forest occurs throughout the central and southern Sierra Nevada in California. It is a common associate of *Pinus contorta* var. *murrayana*/*Ligusticum grayi* Forest, and, environmentally, conditions in these two types are similar. However, the latter usually occurs on moister sites. Stands can cover extensive areas in gently rolling terrain and drainage bottoms, but usually they are smaller than 10 acres (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association can occur at all elevations of the upper montane from 7,800–9,500 feet. Aspects are variable but mostly northeast and northwest. Slopes are gentle or moderate. Stands are typically on benches, lower slopes, and in bottom positions adjacent to and somewhat upslope from flat areas such as meadow complexes or drainage bottoms. Stands in this type have significantly less bare ground and surface gravel as compared to most others in the upper montane of the Sierra Nevada, and microrelief is usually smooth and uniform to gently undulating (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 7,200–8,800 feet in elevation on gentle or moderate slopes. Aspects are variable but primarily southeastern and eastern. Soils are derived from granite and have textures ranging from stony gravel to loamy sand. Dead wood cover is high (up to 75%, many sites have been burned fairly recently). Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Abies magnifica</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Hieracium albiflorum</i>

Yosemite and environs

Tree	<i>Abies magnifica</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
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CHARACTERISTIC SPECIES

Globally

Tree	<i>Abies magnifica</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Hieracium albiflorum</i>

Yosemite and environs

Tree	<i>Abies magnifica</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Hieracium albiflorum</i>

VEGETATION DESCRIPTION

Globally

Stands of *Abies magnifica* - *Pinus contorta* var. *murrayana*/*Hieracium albiflorum* Forest are dense, multilayered forests with understories composed of patches of dense conifer regeneration. Average tree cover is one of the highest in the forests of the upper montane of the Sierra Nevada. The overstory is dominated by *Abies magnifica* with an average 49 percent cover, in a mix with *Pinus contorta* var. *murrayana* with an average 20 percent cover. Understories are sparse; shrub cover is among the lowest in the upper montane forests, and shrubs occur in isolated patches or scattered

individuals. The herb layer, which averages 8 percent, usually has a mix of mesic and moist site indicators, such as the mesic indicators *Hieracium albiflorum*, *Viola purpurea*, and *Kelloggia galioides*, and the moist habitat indicators *Osmorhiza berteroi* (= *Osmorhiza chilensis*) and *Poa bolanderi*. Conifer regeneration is high, dominated by *Abies magnifica*.

Yosemite and environs

In Yosemite and environs, stands of *Abies magnifica* - *Pinus contorta* var. *murrayana*/*Hieracium albiflorum* Forest have dense to open canopies dominated by *Abies magnifica*, averaging between 10 and 50 percent, and *Pinus contorta* var. *murrayana* with an average of greater than 5 percent cover. *Abies concolor* is also frequent with an average cover of 3 percent. The shrub layer is less than 10 percent cover and may include sapling *Abies magnifica*, *Pinus contorta* var. *murrayana*, and the shrub *Chrysolepis sempervirens*. The herb layer is variable and may be patchy, with the most frequent species being seedling *Abies magnifica* and *Pedicularis semibarbata*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Widespread in the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=17)

USGS-NPS Veg Data: 98MCHS5

NRI: 127, 128, 125, 126, 97, 106, 95, 188, 266, 339

Wieslander: **605, 614, 629**

Potter: 2005, 2004, 2014, 2003

Potter (1998): 44 plots outside study area

***Sequoiadendron giganteum* - *Pinus lambertiana*/*Cornus nuttallii* Forest**

COMMON NAME	Giant Sequoia - Sugar Pine/Pacific Dogwood Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Giant temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Sequoiadendron giganteum* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This forest alliance occurs in limited stands (groves) along the western slope of California's Sierra Nevada, scattered over a 260-mile (420 km) long strip that is less than 15 miles (24 km) wide, with most stands occurring in a 70-mile (112 km) long zone from Fresno to Tulare counties. The association is described from Yosemite and environs but is also tentatively described for Sequoia and Kings Canyon national parks.

Yosemite and environs

This association is uncommon in Yosemite and environs. The stands are well known in Wawona, Merced, and Tuolumne groves.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of the association is not available without additional inventory.

Yosemite and environs

This association is found in midslope positions on somewhat poorly drained clay loam and loam soils derived from granite. Elevations range from 5,500–7,500 feet, and aspects are variable. Litter/Duff cover averages 85 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs to date. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Sequoiadendron giganteum</i> , <i>Pinus lambertiana</i> , <i>Abies concolor</i> , <i>Cornus nuttallii</i>
Shrub	<i>Cornus nuttallii</i>
Herbaceous	<i>Adenocaulon bicolor</i> , <i>Galium triflorum</i> , <i>Asyneuma prenanthoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Sequoiadendron giganteum</i> , <i>Pinus lambertiana</i> , <i>Cornus nuttallii</i>
Shrub	<i>Cornus nuttallii</i>

VEGETATION DESCRIPTION

Globally

This association is only described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The tree layer over 50 meters averages 40 percent cover and is composed of *Sequoiadendron giganteum* and *Pinus lambertiana*. The tree layer between 10–50 meters is composed of *Abies concolor*, *Pinus lambertiana*, and *Cornus nuttallii*, averaging a total of 50 percent cover. *Cornus nuttallii* provides an average 25 percent cover in the 1–5 meter shrub layer, while *Corylus cornuta* var. *californica* provides an average of 9 percent. The herb layer varies from 20–80 percent cover and averages 50 percent; *Adenocaulon bicolor* and *Galium triflorum* provide most of the cover in this layer. Other species in the herb layer include *Asyneuma prenanthoides* and *Cornus nuttallii*. Moss cover averages less than 5 percent.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

All three groves of giant sequoia appear to be assignable to the same association.

Plots used to describe association (n=11)

USGS–NPS Veg Data: 98M67, 99S104

Wieslander: **754, 751, 753, 755**

Potter: 2035, 2033, 2034, 2037, 2032

***Pinus jeffreyi* - *Abies magnifica* Woodland**

COMMON NAME	Jeffrey Pine - Red Fir Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association occurs on the eastern slopes of the upper montane of the Sierra Nevada, California. Stands can be somewhat extensive but in most cases are 10 to 50 acres in size (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs on the eastern slope of the Sierra Nevada crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association occurs at the highest elevations of all the *Pinus jeffreyi* dominated communities, ranging from 7,300–9,100 feet, but typically above 8,500 feet. Aspects are generally southeastern through southwestern on slopes that are commonly somewhat steep to steep. Stands commonly occupy upper and middle slope positions. Soils are derived from granitic bedrock or pumice cinders. Soils are characteristically deep and are gravelly sands. Soils are typically excessively drained and are warm, given the dominant aspects.

Yosemite and environs

In Yosemite and environs, elevations range from 6,000–9,100 feet, and aspects are characteristically western through southern. Slopes are gentle to very steep, although generally gentle to somewhat steep. Soils are derived from granitic parent material. Soil depth is variable, and textures range from stony gravel to loam.

MOST ABUNDANT SPECIES

Globally

Tree *Pinus jeffreyi*, *Abies magnifica*

Yosemite and environs

Tree *Pinus jeffreyi*, *Abies magnifica*

CHARACTERISTIC SPECIES

Globally

Tree *Pinus jeffreyi*, *Abies magnifica*
Herbaceous *Arabis platysperma*

Yosemite and environs

Tree *Pinus jeffreyi*, *Abies magnifica*

VEGETATION DESCRIPTION

Globally

Stands in this association are somewhat open forests with sparse understories composed of scattered shrub and herb patches. The overstory is distinguished by the presence of *Pinus jeffreyi*, which averages 26 percent. *Abies magnifica* is generally present as well but sometimes occurs in the middle and lower layers of the tree canopy. *Pinus contorta* var. *murrayana* is an infrequent component of the composition. Shrub cover is very low on most sites; however, in the southern portion of the range stands can be dominated by *Chrysolepis sempervirens*. In the north, *Artemisia tridentata*, *Purshia tridentata*, and *Chrysothamnus viscidiflorus* are present in a few cases. *Arabis platysperma*, *Eriogonum nudum*, and *Achnatherum occidentale* are the most frequent species in the herb layer, which averages between 20 and 25 percent cover. Conifer regeneration is among the lowest of any sites in the upper montane. Both *Abies magnifica* and *Pinus jeffreyi* seedlings occur on the majority of sites, although in low numbers (Potter, 1998).

Yosemite and environs

In Yosemite and environs, both *Abies magnifica* and *Pinus jeffreyi* together average less than 50 percent cover in the tree layer. In general, *Pinus jeffreyi* is more important in canopy cover than *Abies magnifica*. The shrub layer is minimal; *Ceanothus cordulatus* and *Quercus vaccinifolia* are in less than half the stands and average 3 percent cover each. Information on the herb layer is scanty due to the preponderance of Wieslander data but suggests a sparse understory with species such as *Monardella odoratissima* and *Lupinus* sp. as widely scattered and uncommon.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably a relatively uncommon type of the central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note the association is part of the Jeffrey pine alliance, not the Red fir alliance. Its open nature and usual dominance by *Pinus jeffreyi* support this assignment.

Plots used to describe association (n=15)

NRI: 269

Wieslander: 341, 350, 379, 463, 653, 680, 191, 65, 633, 348, 679, 497, 377, 358

Pinus jeffreyi/*Chrysolepis sempervirens* Woodland

COMMON NAME

Jeffrey Pine/Sierran Chinquapin Woodland

SYNONYM

None

PHYSIOGNOMIC CLASS

Woodland

PHYSIOGNOMIC SUBCLASS

Evergreen woodland

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION Rounded-crowned temperate or subpolar needle-leaved evergreen
Woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been observed in the Sentinel Meadow candidate Research Natural Area within Inyo National Forest, California (Talley, 1978).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Chrysolepis sempervirens* Woodland are sampled in the mapping area of Yosemite and environs within the Ackerson Mountain 7-minute topographic quadrangle and elsewhere in the upper montane zone of the park.

ENVIRONMENTAL DESCRIPTION

Globally

A similar if not identical association has been described for granitic southerly facing slopes above 7,400 feet elevation at Sentinel Meadow in Inyo County, east of the Sierra Crest (Talley, 1978).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Chrysolepis sempervirens* Woodland are found at mid to high elevations (6,900–9,500 feet) on gentle to somewhat steep (3–22 degrees) slopes with variable aspects ranging from northeast to south. Soils are poorly developed to moderately well developed with textures ranging from coarse gravelly sandy to silt loam. These soils are shallow to deep and are usually well drained. Parent material is granitic.

MOST ABUNDANT SPECIES

Globally

Tree *Pinus jeffreyi* (Talley, 1978)

Yosemite and environs

Tree *Pinus jeffreyi*

CHARACTERISTIC SPECIES

Globally

Tree *Pinus jeffreyi* (Talley, 1978)

Shrub *Chrysolepis sempervirens* (Talley, 1978)

Yosemite and environs

Tree *Pinus jeffreyi*

Shrub *Chrysolepis sempervirens*

VEGETATION DESCRIPTION

Globally

Stands are dominated by *Pinus jeffreyi* with a mixed understory of *Chrysolepis sempervirens*. *Juniperus occidentalis* var. *australis* is occasional in the tree layer, and there is a sparse understory of herbs including *Streptanthus tortuosus*, *Cryptantha muricata* (= var. *denticulata*), and *Eriogonum spergulinum* var. *reddingianum* (Talley, 1978).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Chrysolepis sempervirens* Woodland are dominated by *Pinus jeffreyi* in the open to intermittent tree canopy and *Chrysolepis sempervirens* in the open to intermittent understory shrub layer. The tree canopy may occasionally include *Abies concolor*, *Abies magnifica*, *Pinus lambertiana*, and *Juniperus occidentalis*. Understory species

contribute to minor cover and may include *Achnatherum webberi*, *Apocynum androsaemifolium*, *Quercus vaccinifolia*, *Arctostaphylos patula*, *Cistanthe monosperma*, *Hydrophyllum occidentale*, *Lupinus confertus*, *Maianthemum racemosum* ssp. *racemosum*, *Pseudostellaria jamesiana*, *Pyrola picta*, *Rumex acetosella*, and *Symphoricarpos rotundifolius* var. *rotundifolius*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably a relatively localized association of the higher and drier portions of the range of Jeffrey pine.

DATABASE CODE To be determined

COMMENTS

Globally

The only description of this association is from the east side of the Sierra Nevada in the Mammoth area. This area is relatively moist given its proximity to the low gap in the Sierra Crest, suggesting additional moisture availability than is modal for the Sierra Nevada east side.

Yosemite and environs

Stands appear to range from the west to the east side.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98M62

Wieslander: 359, 384, 201

***Pinus jeffreyi*/Quercus vaccinifolia Woodland**

COMMON NAME	Jeffrey Pine/Huckleberry Oak Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland
ALLIANCE	<i>Pinus jeffreyi</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland
RANGE	

Globally

This association is found predominantly on the northern portion of the west side of the Sierra Nevada (Potter, 1998).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Quercus vaccinifolia* Woodland are sampled in the mapping area of Yosemite and environs within the Tower Peak 15-minute and the Kibbie, Yosemite Falls, and Tiltill Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Pinus jeffreyi*/*Quercus vaccinifolia* Woodland are found at midelevations (6,300–8,300 feet) on variable slopes (4–58%). These sites are typically southeast- and southwest-facing and on the middle, upper, and ridges of slopes. The microrelief of these sites are usually hummocky and broken. Soils have more surface gravel than most nearby associations. Soil depth is moderately deep to deep (13–40+ inches) with textures that are often sandy loam and sand. The topsoil has a high coarse fragment cover. Soils are excessively drained and are considerably less deep than most other upland montane woodland associations (Potter, 1998).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Quercus vaccinifolia* Woodland are found at midelevations (6,100–8,500 feet) on gentle to steep slopes. Soils are poorly developed to moderately well developed with textures ranging from stony to sandy loam from granitic parent material. Soils are easily drained to poorly drained with depths that are shallow to moderately deep. Rock outcrops, predominately granitic, are a common feature of this association.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Pinus jeffreyi</i> , <i>Abies concolor</i> , <i>Abies magnifica</i> (Potter, 1998)
Shrub	<i>Quercus vaccinifolia</i> , <i>Arctostaphylos nevadensis</i> (Potter, 1998)

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Quercus vaccinifolia</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Pinus jeffreyi</i> , <i>Abies concolor</i> , <i>Abies magnifica</i> (Potter, 1998)
Shrub	<i>Quercus vaccinifolia</i> , <i>Arctostaphylos nevadensis</i> (Potter, 1998)

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Quercus vaccinifolia</i>

VEGETATION DESCRIPTION

Globally

Stands of *Pinus jeffreyi*/*Quercus vaccinifolia* Woodland form an open tree layer dominated by *Pinus jeffreyi* and an intermittent to dense understory shrub layer dominated by *Quercus vaccinifolia*. *Abies concolor* and *Abies magnifica* are typically found here as well. In some cases *Pinus jeffreyi* is in near equal cover to *Abies concolor* and *Abies magnifica*. The understory is characterized by *Quercus vaccinifolia* with usually lesser amounts of *Arctostaphylos nevadensis* and *Ceanothus cordulatus*. Herbaceous species may include *Pedicularis semibarbata*, *Arabis platysperma*, *Eriogonum nudum*, *Gayophytum eriospermum*, *Erigeron breweri*, *Monardella odoratissima* ssp. *pallida*, *Elymus elymoides* ssp. *elymoides*, and *Achnatherum occidentale* (Potter, 1998).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Quercus vaccinifolia* Woodland form an open tree layer dominated by *Pinus jeffreyi* and an intermittent understory shrub layer dominated by *Quercus vaccinifolia*. *Juniperus occidentalis*, *Abies concolor*, *Pinus contorta* var. *murrayana*, and *Quercus kelloggii* may occasionally be found contributing to low cover in the tree layer.

Understory species that may occasionally be present include *Arctostaphylos patula*, *Ceanothus cordulatus*, *Gayophytum diffusum* ssp. *parviflorum*, *Symphoricarpos mollis*, and *Ribes roezlii* (= *Grossularia roezlii*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This is a common type in the midelevations of the northern and central Sierra Nevada and perhaps in the Klamath Mountains as well.

DATABASE CODE To be determined

COMMENTS

Globally

The association differs from *Pinus jeffreyi* - *Abies concolor* Forest by typically having a more open canopy (mean 37% tree cover) and the presence of a well developed understory of *Quercus vaccinifolia* and other shrubs.

Yosemite and environs

Plots used to describe association (n=24)

USGS-NPS Veg Data: 98MCHS4

NRI: 281, 52, 30, 223

Wieslander: 455, 490, 492, 499, 502, 631, 655, 659, 386, 431, 219, 473, 770, 675, 676, 700, 625, 487

Potter: 2018

***Pinus jeffreyi* - *Abies concolor* Woodland**

COMMON NAME

Jeffrey Pine - White Fir Woodland

SYNONYM

None

PHYSIOGNOMIC CLASS

Woodland

PHYSIOGNOMIC SUBCLASS

Evergreen woodland

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE

Pinus jeffreyi Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus jeffreyi* - *Abies concolor* Woodland are sampled in the mapping area of Yosemite and environs within the Tower Peak, Yosemite, Pinecrest, Hetch Hetchy Reservoir, Lake Eleanor, Merced Peak, and Tuolumne Meadows 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus jeffreyi* - *Abies concolor* Woodland are found at mid to high elevations (6,150–8,300 feet) on flat to steep (0–31 degrees) slopes. Aspect varies but is typically xeric including southeast, south, and southwest. These sites are typically found on poorly developed to well developed soils with textures ranging from gravel to loam. Soils are well drained to moderately well drained and shallow to deep. Fire is common, and disturbance levels are usually low at this association.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus jeffreyi*, *Abies concolor*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus jeffreyi*, *Abies concolor*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus jeffreyi* - *Abies concolor* Woodland are dominated by *Pinus jeffreyi* and *Abies concolor* in the open overstory layer. Other tree species that may be found contributing to significantly less cover include *Pinus lambertiana*, *Abies magnifica*, *Pinus contorta* var. *murrayana*, *Calocedrus decurrens*, *Quercus kelloggii*, *Pinus lambertiana*, *Populus tremuloides*, and *Juniperus occidentalis*. *Ceanothus cordulatus* and *Arctostaphylos patula* are often in the understory shrub layer. *Chrysolepis sempervirens*, *Prunus emarginata*, *Quercus vaccinifolia*, *Arctostaphylos nevadensis*, and *Artemisia tridentata* may also be present but in low numbers. *Pteridium aquilinum* var. *pubescens* is often in the herb layer. Other herbaceous species may include *Gayophytum diffusum* ssp. *parviflorum*, *Apocynum androsaemifolium*, *Kelloggia galioides*, *Erigeron breweri*, *Eriogonum marifolium*, and *Hieracium albiflorum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Given the abundance of samples in the Yosemite area, we assume that this association is widespread here and elsewhere at least in the central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

See comments on *Pinus jeffreyi/Quercus vaccinifolia* Woodland.

Plots used to describe association (n=39)

NRI: 51, 24, 93, 21, 28, 38, 58, 164

Wieslander: 349, 12, 335, 647, 357, 500, 503, 504, 506, 508, 509, 519, 568, 595, 469, 478, 491, 380, 383, 376, 245, 246, 247, 332, 352, 353, 93, 471, 472, 475, 471

Potter (pers. com 2002): Has 7 additional plots from central and southern Sierra Nevada

***Pinus jeffreyi*/Arctostaphylos patula Woodland**

COMMON NAME	Jeffrey Pine/Greenleaf Manzanita Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found at the mid to upper elevations in the Sierra Nevada and appears more commonly in the south and east sides. Stands often cover tens of acres and occasionally cover several hundreds of acres (Potter, 1998).

Yosemite and environs

Stands of *Pinus jeffreyi*/Arctostaphylos patula Woodland are sampled in the mapping area of Yosemite and environs within the Merced Peak 15-minute, Tower Peak 15-minute, and Tower Peak and Yosemite 15-minute topographic quadrangles and the Hetch Hetchy Reservoir and Ackerson Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Pinus jeffreyi*/Arctostaphylos patula Woodland are found at mid to high elevations (6,660–9,520 feet) on gentle to steep (4–64%) slopes of variable, but mostly southeast and southwest, aspects. These sites are on middle and upper slopes and ridge tops. There are significantly higher levels of bare ground, surface gravel, and bare rock compared to other sites. This association is found on poorly developed to moderately developed soils. Parent material is most frequently granitic but some are derived from volcanic materials. Soil depths are usually moderately deep to deep (5–40+ inches), and textures are sand, sandy loams, and loams. Drainage is usually excessive due to coarse soil textures (Potter, 1998).

Yosemite and environs

Stands of *Pinus jeffreyi*/Arctostaphylos patula Woodland are found at midelevations (5,700–8,400 feet) on gentle to somewhat steep slopes of variable, but mostly southerly, aspects. This association is found on poorly developed to moderately developed soils with textures ranging from stony to sandy loam on a granitic substrate. These soils are well drained to moderately well drained. Parent material is granitic.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Pinus jeffreyi</i> , <i>Abies magnifica</i> (Potter, 1998)
Shrub	<i>Arctostaphylos patula</i> , <i>Arctostaphylos nevadensis</i> , <i>Ceanothus velutinus</i> (Potter, 1998)

Yosemite and environs

Shrub	<i>Arctostaphylos patula</i>
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CHARACTERISTIC SPECIES

Globally

Tree *Pinus jeffreyi*, *Abies magnifica*, *Abies concolor* (Potter, 1998)
Shrub *Arctostaphylos patula*, *Arctostaphylos nevadensis*, *Ceanothus velutinus*, *Chrysolepis sempervirens* (Potter, 1998)

Yosemite and environs

Tree *Pinus jeffreyi*
Shrub *Arctostaphylos patula*

VEGETATION DESCRIPTION

Globally

Stands of the *Pinus jeffreyi*/*Arctostaphylos patula* Woodland form an open tree layer underlain by a dense shrub layer. The open tree canopy is dominated by *Pinus jeffreyi*. *Abies magnifica* is often present, and *Abies concolor* is occasionally present. In some cases, *Pinus jeffreyi* is less abundant than *Abies magnifica* and *Abies concolor*. The shrub layer consists of *Arctostaphylos patula* or *Ceanothus velutinus* (on the east side of Sierra Nevada). Other shrubs also found in this association include *Chrysolepis sempervirens* (= *Castanopsis sempervirens*), *Ceanothus cordulatus*, *Arctostaphylos nevadensis*, and *Prunus emarginata*. The open herb layer may include low cover of *Arabis platysperma* var. *howellii*, *Gayophytum eriospermum*, *Pedicularis semibarbata*, *Cistanthe umbellata* (= *Calyptidium umbellatum*), *Erigeron breweri*, *Eriogonum nudum*, *Monardella odoratissima* ssp. *pallida*, *Erigeron peregrinus*, *Elymus elymoides*, and *Achnatherum occidentale* (Potter, 1998).

Yosemite and environs

Stands of *Pinus jeffreyi*/*Arctostaphylos patula* Woodland form an open tree and shrub layer. The open tree canopy dominated by *Pinus jeffreyi* is occasionally associated with *Calocedrus decurrens*, *Abies concolor*, *Pinus ponderosa*, *Juniperus occidentalis*, *Quercus kelloggii*, *Abies magnifica*, *Pinus contorta*, *Pinus monticola*, *Pinus lambertiana*, *Quercus chrysolepis*, and *Pseudotsuga menziesii*. *Arctostaphylos patula* dominates the shrub layer. Other shrubs also found in this association include *Ceanothus cordulatus*, *Chrysolepis sempervirens*, *Arctostaphylos viscida*, *Arctostaphylos nevadensis*, and *Quercus vaccinifolia*. The open herb layer may include low amounts of *Pellaea mucronata* ssp. *mucronata*, *Bromus tectorum*, *Gayophytum diffusum* ssp. *parviflorum*, *Clarkia rhomboidea*, *Poa secunda*, and *Monardella odoratissima* ssp. *pallida*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This association is likely to be relatively common throughout the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=17)

NRI: 36, 56, 45, 47, 228

Wieslander: 208, 550, 584, 501, 73, 156, 60, 576, 62, 216, 297, 193

***Pinus jeffreyi/Ceanothus cordulatus* Woodland [Provisional]**

COMMON NAME	Jeffrey Pine/Mountain Whitethorn Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association ranges throughout the upper montane of the central and southern Sierra Nevada in California, although stands become more common to the north of the San Joaquin River and in the eastern Sierra Nevada (Potter, 1998).

Yosemite and environs

This association is uncommon in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Elevations range from 6,800–9,400 feet, but stands are most commonly below 8,000 feet. Aspects are usually southeastern through southwestern on slopes that are gentle or moderate. Stands are located in middle and lower slope positions. Soils are usually formed in place over granitic or volcanic bedrock and are generally deep, sandy loams. Soils are usually excessively drained, and soil temperatures are among the highest in the upper montane of the Sierra Nevada. Litter thickness is generally less, and cover of bare ground and gravel is generally more than other types (Potter, 1998).

Yosemite and environs

In Yosemite and environs, elevations range from 5,900–7,200 feet, and aspects are variable.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Pinus jeffreyi</i> , <i>Abies magnifica</i>
Shrub	<i>Ceanothus cordulatus</i>

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
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CHARACTERISTIC SPECIES

Globally

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Ceanothus cordulatus</i>

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Ceanothus cordulatus</i>

VEGETATION DESCRIPTION

Globally

Stands in this association are open woodlands with scattered, sometimes large patches of shrubs. Total tree cover is among the lowest of the forested associations of the upper montane of the Sierra Nevada. The shrub cover is significantly higher than other sites. The overstory is distinguished by the presence of *Pinus jeffreyi*, which averages 16 percent cover. *Abies magnifica* is generally present, with an average 15 percent cover, and *Pinus contorta* var. *murrayana* and *Abies concolor* may occasionally also be present. In a few cases, *Pinus jeffreyi* may be the only member of the overstory, while other stands may be dominated by *Abies magnifica*, *Pinus contorta* var. *murrayana*, and *Abies concolor*. In these cases the understories are dominated by *Ceanothus cordulatus*, *Artemisia tridentata*, *Purshia tridentata*, or *Chrysothamnus viscidiflorus* and indicate the association. The shrub layer is often a mix of species in two distinct types that occur on the westside or eastside forests. Westside stands are dominated by *Ceanothus cordulatus* sometimes mixed with *Artemisia tridentata*. Eastside stands can be dominated by any one of four species: *Ceanothus cordulatus*, *Artemisia tridentata*, *Purshia tridentata*, or *Chrysothamnus viscidiflorus*. Usually two of the four species occur on any particular site, but stands dominated by *Artemisia tridentata*, *Purshia tridentata*, or *Chrysothamnus viscidiflorus* on the east side generally do not contain *Ceanothus cordulatus*. West side stands tend to be clearly dominated by *Ceanothus cordulatus*, whereas eastside stands tend to be mixed low-shrub communities. *Arabis platysperma*, *Gayophytum eriospermum*, *Elymus elymoides*, and *Achnatherum occidentale* are the most frequent species in the herb layer, which varies depending on soil moisture. Conifer regeneration is low, with no one species dominating (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association generally consists of a dense shrub layer dominated by *Ceanothus cordulatus* with emergent *Pinus jeffreyi* trees; however, in one stand, *Ceanothus cordulatus* cover was 1 percent. *Pinus jeffreyi* averages 35 percent cover. Other trees that may be present in low numbers are *Calocedrus decurrens* and *Abies concolor*. In the shrub layer, *Ceanothus cordulatus* averages 53 percent cover. The shrub species *Arctostaphylos patula* and *Prunus emarginata* may also be present in low numbers. The herb layer is sparse, and the species variable.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION This type is relatively uncommon in Yosemite and probably elsewhere. However it has been sampled from Lake Tahoe to Onion Valley.

DATABASE CODE To be determined

COMMENTS

Globally

Because of the divergence of shrub understories in eastside and westside settings in Potter's (1998) description, there may be reason enough to consider splitting this into an eastside and a westside association. The *Pinus jeffreyi*/*Purshia tridentata* Woodland (Taylor, 1980) defined and described as an eastside woodland of Zones VII and VIII is equivalent to the eastside segment of this Potter (1998) type. The Yosemite description of *Pinus jeffreyi*/*Ceanothus cordulatus* pertains strictly to those open stands of *P. jeffreyi* with an understory dominated by *Ceanothus cordulatus*.

Plots used to describe association (n=4)

USGS-NPS Veg Data: 99K106

NRI: 350, 57

Potter (pers. com 2002): has 18 plots outside of study area

***Abies magnifica* - *Abies concolor* - *Pinus jeffreyi* Forest**

COMMON NAME	Red Fir - White Fir - Jeffrey Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Abies magnifica* - *Abies concolor* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Abies magnifica - *Abies concolor* - *Pinus jeffreyi* Forest is widespread at middle to lower elevations in the central and southern Sierra Nevada, California. Stands range from smaller than 5 acres to over 100 acres (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Elevations generally lie between 6,500–8,000 feet. Aspects are variable, but a significant portion lie on southern slopes where solar radiation levels are significantly higher than most other sites. Stands are usually on upper slopes, and some are on ridge tops. Slope angles are moderate to somewhat steep. Stand size is usually small, often covering less than an acre on small rock outcrops but sometimes covering more than 50 acres. Sites have significantly less surface gravel and a deeper litter layer than drier sites commonly encountered. Soils are usually formed in place on granitic bedrock, but often form on alluvium, colluvium, or glacial tills and outwash. In general, soils are deeper than most other sites. Soils are typically sandy loams with rare sands and loams. The average water-holding capacity is one of the highest in the upper montane of the Sierra Nevada. Soils are typically well drained (Potter, 1998).

Yosemite and environs

In Yosemite and environs, this association occurs between 6,300–7,900 feet in elevation on moderate to somewhat steep slopes. Aspects are variable. Soils are derived from granite; have textures ranging from stony, gravelly, sandy loams to sandy loams; and are moderately to well drained. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree *Abies magnifica*, *Abies concolor*, *Pinus jeffreyi*

Yosemite and environs

Tree *Abies magnifica*, *Abies concolor*, *Pinus jeffreyi*

CHARACTERISTIC SPECIES

Globally

Tree *Abies magnifica*, *Abies concolor*, *Pinus jeffreyi*

Yosemite and environs

Tree *Abies magnifica*, *Abies concolor*, *Pinus jeffreyi*

VEGETATION DESCRIPTION

Globally

These are moderately dense forested stands with light understory vegetation. Overstory layers are distinguished by the presence of *Abies concolor* and *Pinus jeffreyi*, averaging 16 and 18 percent cover, respectively, in a mix with *Abies concolor*, with an average 29 percent cover in the overstory. Understories are somewhat sparse. Occasionally *Chrysolepis sempervirens* can become a major component in the shrub layer and dominate understories, but in most cases shrubs occur as scattered patches and individuals. The herb layer most often contains *Pedicularis semibarbata*, *Kelloggia galioides*, *Hieracium albiflorum*, *Viola purpurea*, and *Pyrola picta*, although none of these is frequent. An important element in these understories is the presence of several shrub and forb species that occur at low frequency but can dominate sites in early successional sequences. In the shrub layer, these are *Ceanothus cordulatus*, *Prunus emarginata*, *Arctostaphylos patula*, and *Chrysolepis sempervirens*. In the herb layer, they include *Pteridium aquilinum*, *Lupinus adsurgens*, *Lupinus andersonii*, and *Achnatherum lemmonii*. *Abies magnifica* and *Abies concolor* are the most common tree species regenerating; *Pinus jeffreyi* regeneration is low.

Yosemite and environs

In Yosemite and environs, this association is characterized by an average of 25 percent cover of *Abies concolor* and between 5 percent and 25 percent cover of *Abies magnifica* and *Pinus jeffreyi*. Trees may attain heights up to 50 meters. Shrub cover is typically open (less than 5%). Shrubs may include *Arctostaphylos nevadensis*, *Ceanothus cordulatus*, and *Chrysolepis sempervirens*. Herb cover is also low, averaging between 5 and 10 percent, and no species is frequent. Species with the highest cover include *Pedicularis semibarbata*, *Angelica breweri*, *Galium bolanderi*, and *Senecio integerrimus* var. *exaltatus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Probably moderately common, but stands have been impacted by logging throughout most of the range of this type.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=10)

USGS–NPS Veg Data: 98M65, 99K125

NRI: 90, 100, 275

Wieslander: 54, 627, 51, 523

Potter: 2021

Abies magnifica - *Abies concolor* Forest

COMMON NAME	Red Fir - White Fir Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Abies magnifica* - *Abies concolor* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Abies magnifica - *Abies concolor* Forest is widespread in the central and southern Sierra Nevada, California. Stands range from smaller than 5 acres to several hundred acres (Potter, 1998).

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is located at middle to lower elevations, generally ranging from 6,500–8,800 feet. Aspects are variable, but northeast to northwest slopes are common, and average solar radiation levels are among the lowest in the region. Slopes are gentle to steep. Stands occur on all slope positions. Sites have significantly less bare ground and surface gravel and a deeper litter layer than other sites. Soils are usually formed in place on granitic bedrock. In general, soils are deeper than most other sites and are usually sandy. The average water-holding capacity is one of the highest in the upper montane of the Sierra Nevada. Soils are typically well drained.

Yosemite and environs

In Yosemite and environs, this association occurs between 6,300–8,600 feet in elevation on flat to somewhat steep slopes, although most commonly on moderate and somewhat steep. Aspects are variable but primarily northern and western. Soils are derived from granite and have textures ranging from stony gravels to loams. Sites are upland.

MOST ABUNDANT SPECIES

Globally

Tree *Abies magnifica*, *Abies concolor*

Yosemite and environs

Tree *Abies magnifica*, *Abies concolor*

CHARACTERISTIC SPECIES

Globally

Tree *Abies magnifica*, *Abies concolor*

Yosemite and environs

Tree *Abies magnifica*, *Abies concolor*

VEGETATION DESCRIPTION

Globally

Stands in this association are dense, multilayered forests with somewhat open overstories. They are often adjacent to or interspersed with *Abies concolor* - *Pinus lambertiana* - *Abies magnifica* Forest and *Abies magnifica* - *Abies concolor* - *Pinus jeffreyi* Forest on mesic sites. Overstories are distinguished by the presence of *Abies concolor* with an average 25 percent cover in a mix with *Abies magnifica* with an average 55 percent cover, and together these species dominate the

stands. Understory shrub cover is significantly lower than other associations in late seral stands, averaging 3 percent. *Symphoricarpos acutus*, *Chrysolepis sempervirens*, and *Ribes roezlii* are the most common shrubs, but none are frequent. Herb cover is also low, averaging 15 percent, and while no species are frequent, the most common ones are *Pyrola picta*, *Hieracium albiflorum*, and *Corallorhiza maculata*. *Abies magnifica* is the dominant regenerating conifer.

Yosemite and environs

In Yosemite and environs, this association is characterized by an average 2 percent cover of *Abies concolor* and 2 percent cover of *Abies magnifica*. The understory shrub layer is minimal; *Chrysolepis sempervirens* has the highest frequency (48%) and cover (less than 0.5%).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Probably was relatively widespread in the central and southern Sierra Nevada, but stands reduced in extent and quality by logging.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=23)

Wieslander: 599, 507, 458, 459, 56, 187, 203, 205, 53, 446, 427, 771, 552, 309, 319, 322, 327, 329, 189, 300, 325

Potter: 653

ECOLOGICAL ZONE IV: SUBALPINE FORESTS, WOODLANDS, AND MEADOWS OF THE WEST SLOPE

HERBACEOUS ASSOCIATIONS

Carex spectabilis-*Senecio triangularis* Herbaceous Vegetation

COMMON NAME	Showy Sedge - Arrowleaf Ragwort Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland
ALLIANCE	<i>Carex spectabilis</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association has been described from an outflow creek at Green Treble Lake near Tioga Pass and at the Harvey Monroe Hall Research Natural Area (RNA).

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory. In general, communities in this alliance occur on well drained, moderately steep to steep slopes that are clear of snow by early summer. Soils are comprised of varied parent materials but are usually young and poorly developed. This alliance often forms part of a subalpine parkland mosaic just below the upper treeline (NatureServe 2001).

Yosemite and environs

This herbaceous vegetation has been described from drainages in the lower alpine zone near treeline (10,200 feet elevation). The stands are narrow (< 10 meters wide) and occur on the banks of a high-gradient ephemeral stream. Sites are cold, moist and may be shaded by nearby trees. They accumulate deep snowpacks in winter and are temporarily flooded in the spring during snowmelt. The substrate is typically shallow, stony, and derived from alluvium. The soil is saturated near the surface most of the growing season. Soil texture is variable and ranges from deposits of sand and silt to silty clay loam.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex spectabilis*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex spectabilis*, *Senecio triangularis*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory. In general, associations in this alliance are lush herbaceous communities with a mixture of forbs and graminoids. *Carex spectabilis* is the dominant species in terms of cover and constancy. Forbs also have high constancy.

Yosemite and environs

This temporarily flooded herbaceous association is dominated by *Carex spectabilis* (37% cover) with traces of emergent *Salix orestera*. Several forbs and graminoids are present at low cover values. The forb *Senecio triangularis* (0.5% cover) is diagnostic. *Poa wheeleri* attains 2.5 percent cover, and other graminoids present at trace amounts may include *Carex heteroneura*, *Carex vernacula*, *Juncus mertensianus*, *Poa fendleriana* ssp. *fendleriana*, and *Trisetum spicatum*. *Mimulus tilingii* (2.5% cover) is the most common forb. *Antennaria media*, *Penstemon heterodoxus*, *Phleum alpinum*, *Potentilla flabellifolia*, *Stellaria calycantha*, and/or *Veronica wormskjoldii* may be present in trace amounts.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Some confusion exists about the placement of this association. There is a *Senecio triangularis* Temporarily Flooded Herbaceous Alliance described for western North America. However, the dominance of *Carex spectabilis* locally suggests that this should be the nominal species for the alliance.

Yosemite and environs

This is a relatively moist association with more permanent water available in the substrate compared to the other association (*Carex spectabilis* - *Sibbaldia procumbens*, Taylor, 1984) locally represented. That other association has insufficient data to be described herein.

Plots used to describe association (n=1)

USGS-NPS Veg Data: 99K158

***Deschampsia caespitosa* - *Polygonum bistortoides* Herbaceous Vegetation**

COMMON NAME	Hairgrass - American Bistort Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Seasonally flooded temperate or subpolar grassland

ALLIANCE *Deschampsia caespitosa* Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association is known from the vicinity of Yosemite, Sequoia National Park (Benedict, 1983), and elsewhere in the Sierra Nevada (Ratliff, 1982, 1985).

Yosemite and environs

Stands of this association are found in mountain meadows throughout the mapping area from ecological Zone III up to ecological Zones V and VI. Stands have been sampled in the Akerson Meadow, Yosemite Falls, Tioga Pass, Tamarack Flat, Koib Peak, and Falls Ridge 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association occupies wet and moist meadows, streamsides, and lake margins in the montane and subalpine zone of the Sierra Nevada.

Yosemite and environs

Stands of this grassland association are found on gentle to moderate, lower and middle slopes. Elevations are between 6,000–10,500 feet, and aspects are all except north. Stands mostly occupy seasonally flooded to saturated, gently to moderately sloping low slopes and basins but some mid slope saturated meadows. Soils are seasonally flooded, mostly poorly drained sandy to silt loams and mucks derived from various parent materials.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Deschampsia caespitosa*, *Polygonum bistortoides*, *Senecio scorzonella*, *Solidago multiradiata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Deschampsia caespitosa*, *Polygonum bistortoides*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This perennial bunchgrass vegetation is variable depending on the elevation. It usually forms a dense cover from 60–90 percent dominated by *Deschampsia caespitosa* (26.3% cover) with forbs including *Senecio scorzonella* (3% cover), *Solidago multiradiata* (7.5%), *Lupinus lepidus* (5% cover), *Achillea millefolium* (2.5% cover), *Oreostemma alpinum* var. *alpinum* (2.5% cover), *Polygonum bistortoides* (2.5% cover), *Trifolium monanthum* (2.5% cover), and *Potentilla drummondii* (2.5% cover). The most frequent graminoid associates include *Calamagrostis breweri* (2.5% cover), *Phleum alpinum* (2.5% cover), *Poa fendleriana* (2.5% cover), *Carex luzulifolia* (15% cover), *Trisetum wolfii* (0.5% cover), *Eleocharis quinqueflora* (1% cover), *Phleum alpinum* (0.4% cover), *Carex scopulorum* (1% cover), *Juncus mexicanus* (1% cover), *Muhlenbergia richardsonis* (0.7% cover), *Calamagrostis breweri* (0.7% cover), and/or *Trisetum spicatum* (0.7% cover). *Polygonum bistortoides* is the only species other than *Deschampsia* that occurs on all of the plots sampled.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be widespread, but of limited extent in the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Potter (pers. com. 2002) has 23 plots he characterizes as representing *Deschampsia caespitosa* alliance throughout the Sierra Nevada; these have not been split into associations. Only 13 have *Polygonum bistortoides*, suggesting further variation in this alliance outside of Yosemite.

Yosemite and environs

Note: As a result of the overlap between associations defined either from limited data or from elsewhere in the Sierra, the 13 samples collected representing this alliance were lumped into one grand association with *Polygonum bistortoides* as the main indicator species. The following previously defined associations have been at least temporarily subsumed for the Yosemite classification: Tufted hairgrass - Coville ragwort (*Deschampsia caespitosa* - *Senecio scorzonella*) association (Benedict, 1983) (n=4) 98M93, 98M82, 99K151, 99K173; Tufted hairgrass - Mountain goldenrod (*Deschampsia caespitosa* - *Solidago multiradiata*) association (Taylor, 1984) (n=1) 99K174; Tufted hairgrass - Longstalk clover (*Deschampsia caespitosa* - *Trifolium longipes*) association (Ratliff, 1982, 1985) (n=1) 99S119; and Tufted hairgrass - Brewer bittercress (*Deschampsia caespitosa* - *Cardamine breweri*) association (Benedict, 1983) (n=2) 99S114, 99S118.

Plots used to describe association (n=13)

USGS–NPS Veg Data: 98M93, 98M82, 99K151, 99K173, 99K174, 99K107, 99K101, 99K139, 98M81, 99S114, 99S118, 99S119
Potter: 1650

***Calamagrostis breweri* - *Vaccinium caespitosum* Herbaceous Vegetation**

COMMON NAME	Shorthair Reedgrass - Dwarf Blueberry Herbaceous Vegetation
SYNONYM	Shorthair Reedgrass Series
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland

ALLIANCE *Calamagrostis breweri* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Stands of this association have been described from the subalpine regions of the central Sierra Nevada near Yosemite. However, they are expected to occur elsewhere at least south to Sequoia and Kings Canyon national parks.

Yosemite and environs

This association has been sampled at several subalpine meadow sites near the Sierra Nevada crest.

ENVIRONMENTAL DESCRIPTION

Globally

This subalpine and alpine sod grassland of California and Oregon occurs on meadows, flats, and gentle slopes from 4,200–12,500 feet elevation. Optimal habitats have subsurface moisture. The precipitation regime where this association occurs is strongly seasonal, with most precipitation falling in the winter months as snow. Summers are very dry. This association forms large stands, which often intergrade with other meadow, forest, and woodland types.

Yosemite and environs

Stands of this association occur on very gentle lower slopes and basin floors between 8,500–10,600 feet of elevation. Aspect is not important for the type as slopes seldom exceed 2 percent. Sites are seasonally saturated/flooded and usually have perennial subsurface moisture. Soils are loams and may contain very high amounts of organic material such as peat.

MOST ABUNDANT SPECIES

Globally

Shrub	<i>Vaccinium caespitosum</i>
Herbaceous	<i>Calamagrostis breweri</i>

Yosemite and environs

Shrub	<i>Vaccinium caespitosum</i>
Herbaceous	<i>Calamagrostis breweri</i>

CHARACTERISTIC SPECIES

Globally

Shrub	<i>Vaccinium caespitosum</i>
Herbaceous	<i>Calamagrostis breweri</i>

Yosemite and environs

Shrub	<i>Vaccinium caespitosum</i>
Herbaceous	<i>Calamagrostis breweri</i>

VEGETATION DESCRIPTION

Globally

This alpine/subalpine meadow association contains *Calamagrostis breweri* as an important or dominant grass in the herbaceous layer, with other graminoids like *Danthonia intermedia* important canopy species. *Oreostemma alpigenum* (= *Aster alpigenus*) is the dominant forb, with the subshrub *Vaccinium caespitosum* present. Other associates may include *Carex* spp. *Gentiana newberryi*, *Ptilagrostis kingii*, *Achnatherum nelsonii*, *Lupinus lepidus*, *Potentilla* spp. *Trisetum spicatum*, and/or *Antennaria rosea*.

Yosemite and environs

Yosemite stands of this short alpine or subalpine sod grassland association are codominated by *Vaccinium caespitosum* (25% cover) and *Calamagrostis breweri* (24% cover). The forb *Oreostemma alpigenum* var. *alpigenum* (12% cover) is an important species. Other important forbs may include *Gentiana newberryi* (1% cover), *Castilleja newberryi* (1% cover), *Antennaria rosea* (2% cover), and the graminoids *Carex spectabilis* (1% cover) and/or *Danthonia intermedia* (3% cover). Traces of other forb and graminoid species are present.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This association is generally common in many subalpine meadow systems throughout the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=13)

USGS-NPS Veg Data: 98K81, 98K86, 98M117, 98M128

NRI: 161, 49, 67, 69, 152, 153, 154, 155, 156

***Calamagrostis breweri* - *Oreostemma alpigenum* var. *alpigenum* Herbaceous Vegetation [Provisional]**

COMMON NAME	Shorthair Reedgrass - Tundra Aster Herbaceous Vegetation
SYNONYM	Shorthair Reedgrass Series
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland
ALLIANCE	<i>Calamagrostis breweri</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found on the eastern side of the Sierra Crest near Tenaya Lake, Tioga Pass, and Lee Vining Creek.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association occur on very gentle lower slopes and basin floors between 8,000–10,000 feet of elevation. Aspect is not important for the type as slopes seldom exceed 2 percent. Sites are seasonally saturated/flooded and usually have perennial subsurface moisture. Soils are sandy to silt loams. These meadows are typically covered by deep blankets of snow through most of the winter and spring.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis breweri*, *Oreostemma alpigenum* var. *alpigenum*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis breweri*, *Oreostemma alpigenum* var. *alpigenum*

VEGETATION DESCRIPTION

Globally

This alpine/subalpine meadow association contains *Calamagrostis breweri* as an important or dominant grass in the herbaceous layer, with other graminoids like *Danthonia intermedia* important canopy species. *Oreostemma alpigenum* (= *Aster alpigenuus*) is the dominant forb, with the subshrub *Vaccinium caespitosum* present. Other associates may include *Carex* spp. *Polygonum bistortoides*, *Ptilagrostis kingii*, *Gentianopsis holopetala*, *Potentilla* spp. *Trisetum spicatum*, and/or *Antennaria* spp.

Yosemite and environs

This alpine/subalpine meadow association contains *Calamagrostis breweri* (33% cover) as the dominant grass in the herbaceous layer, with other graminoids like *Danthonia intermedia* (5% cover), *Carex exserta* (4.5% cover), *Carex fissuricola* (7% cover), and *Deschampsia caespitosa* (4% cover) important canopy species. Several other graminoids may be present at low cover values. *Oreostemma alpigenum* (= *Aster alpigenuus*) is the dominant forb, with the subshrub *Vaccinium caespitosum* present but in low cover. Other forb associates may include *Gentianopsis holopetala* (0.4% cover), *Senecio scorzonella* (4% cover), *Polygonum bistortoides* (3.8% cover), *Ranunculus alismifolius* (0.75% cover),

Sibbaldia procumbens (0.25% cover), *Ptilagrostis kingii* (= *Oryzopsis kingii*), *Muhlenbergia fliformis*, *Carex subnigricans* (2.5% cover), and/or *Antennaria* spp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Potter (pers com 2002) has 19 plots throughout the subalpine Sierra Nevada with *Calamagrostis breweri* and *Oreostemma alpigenum*, but these have not been split further analyzed at the association level.

Yosemite and environs

This description includes the former Shorthair reedgrass – Gentian - Alpine aster (*Calamagrostis breweri* - *Gentianella* - *Aster alpigenus*) association (Ratliff, 1982, 1985) described in the interim classification. Potter (2000 ms) describes a *Carex subnigricans* - *Oreostemma alpigenum* (= *Aster alpigenus*) association from the High Sierra, which resembles stands in this association that are strongly dominated by *Oreostemma*. With future sampling, it may become apparent that there is a *Carex subnigricans* association definable from the Yosemite region.

Plots used to describe association (n=5)

USGS–NPS Veg Data: 98K75, 98M76, 99K159, 99K167, 99K168

***Calamagrostis breweri* - *Trisetum spicatum* Herbaceous Vegetation [Provisional]**

COMMON NAME	Shorthair Reedgrass - Narrow False Oats Herbaceous Vegetation
SYNONYM	Shorthair Reedgrass Series
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland
ALLIANCE	<i>Calamagrostis breweri</i> Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association have been found in the vicinity of Tioga Pass.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association occur on basin floors to mid-slopes between 9,500–10,400 feet of elevation. Aspect does not seem to be important in differentiating this type. Slopes are gentle to moderate. Sites are temporarily saturated/flooded. Soils are sandy to silt loams. These stands are typically covered by a heavy blanket of snow throughout most of the winter and spring.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis breweri*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis breweri*, *Trisetum spicatum*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is heavily dominated by *Calamagrostis breweri* (50% cover), with *Trisetum spicatum* (5% cover) an important species. Other graminoids providing traces of cover include *Luzula congesta*, *Ptilagrostis kingii*, *Carex subnigricans*, and/or *Phleum alpinum*. Forbs provide up to about 10 percent cover, and the most common include *Potentilla drummondii* (0.5% cover), *Solidago multiradiata* (7.6% cover), *Castilleja lemmonii* (0.8% cover), *Oreostemma alpigenum* (0.8% cover), *Antennaria media* (4% cover), *Pedicularis groenlandica* (0.3% cover), *Penstemon heterodoxus* (0.3% cover), *Rumex paucifolius* (0.3% cover), and/or *Senecio scorzonella* (0.3% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association should be considered tentative due to the relatively small number of plots available. Further data are needed to substantiate its existence and its separation from the *Calamagrostis breweri*- *Oreostemma alpigenum* var. *alpigenum* association described previously.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99K119, 99K123, 99K146, 99S141

Potter (pers com. 2002): has 10 additional plots outside of study area

***Calamagrostis breweri* - *Juncus drummondii* Herbaceous Vegetation**

COMMON NAME	Shorthair Reedgrass – Drummond's Rush Herbaceous Vegetation
SYNONYM	Shorthair Reedgrass Series (Sawyer and Keeler–Wolf 1995, in part)
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland

ALLIANCE *Calamagrostis breweri* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association have been studied at the Hall RNA and at Tioga Lake, both near Tioga Pass.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association occur on lower slopes and basin floors at about 10,000 feet of elevation. Aspect does not seem to be important in differentiating this type. Slopes are gentle to moderate. Sites are seasonally saturated. Soils are sandy to silt loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis breweri*, *Juncus drummondii*, *Ptilagrostis kingii*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis breweri*, *Juncus drummondii*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This dense grassland association is codominated by *Calamagrostis breweri* (33% cover) and *Juncus drummondii* (33% cover). *Ptilagrostis kingii* (33% cover) may be important in some stands. Other common graminoid associates may include *Agrostis humilis* (15% cover), *Trisetum spicatum* (2.5% cover), and traces of *Carex abrupta*, *Carex subnigricans*, *Deschampsia caespitosa*, *Luzula congesta*, *Ptilagrostis kingii*, *Poa pratensis*, *Poa stebbinsii*, and/or *Phleum alpinum*. The forb component is fairly minor, but the more common species present may include *Antennaria corymbosa* (2.5% cover) and traces of *Polygonum bistortoides*, *Potentilla diversifolia*, *Sibbaldia procumbens*, and/or *Trifolium monanthum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=1)

USGS-NPS Veg Data: 99K121

Potter (pers com. 2002): has 3 additional plots outside study area

***Calamagrostis canadensis* Herbaceous Vegetation** [Provisional]

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

PHYSIOGNOMIC SUBGROUP

FORMATION

Bluejoint Herbaceous Vegetation

Shorthair Reedgrass

Herbaceous Vegetation

Perennial graminoid vegetation

Temperate or subpolar grassland

Natural/Seminatural

Seasonally flooded temperate or subpolar grassland

ALLIANCE

Calamagrostis canadensis Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. Other associations of this alliance occur in the Colorado Rockies. The species is very widespread in northern North America.

Yosemite and environs

Stands of this association have been sampled in the mapping area at Half Dome, Tioga Meadows, Akerson Meadow, Tioga Pass, and Yosemite Falls 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association occur on flat to moderately sloping lower slopes along lakeshores, streams, and wet meadows ranging from 4,550–9,560 feet elevation. Aspect does not seem to be important in differentiating this type. Sites are seasonally saturated. Soils are poorly drained to somewhat poorly drained sandy loams, silty clay, and muck.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis canadensis*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis canadensis*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This dense palustrine grassland covers 80–90 percent of the surface on average and is usually strongly dominated by *Calamagrostis canadensis* (mean 53% cover), with *Polygonum bistortoides*, *Carex utriculata*, and *Senecio triangularis* commonly present in low cover. A large number of additional species are occasionally present in the stands and include *Lupinus latifolius*, *Caltha leptosepala*, *Carex vesicaria*, *Dodecatheon jeffreyi*, *Epilobium ciliatum*, *Glyceria striata* (= *Glyceria elata*), *Aconitum columbianum*, *Lotus oblongifolius*, *Viola macloskeyi*, *Mimulus guttatus*, *Perideridia bolanderi*, *Sphenosciadium capitellatum*, *Thalictrum fendleri*, *Trifolium wormskioldii*, *Veratrum californicum*, *Ledum glandulosum*, *Mimulus primuloides*, *Symphyotrichum spathulatum* (= *Aster occidentalis*), *Allium validum*, *Carex abrupta*, *Carex mariposana*, *Carex spectabilis*, *Hordeum brachyantherum*, *Achillea millefolium*, *Lupinus burkei* ssp. *burkei*, *Viola adunca*, *Perideridia parishii*, *Salix lasiolepis*, *Solidago canadensis*, *Hypericum anagalloides*, *Penstemon rydbergii*, and *Phleum alpinum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4S3?

RANK JUSTIFICATION	Probably relatively widespread in the mountains of northern California and perhaps beyond, but of limited extent.
DATABASE CODE	To be determined

COMMENTS

Globally

Yosemite and environs

There is a suggestion that an upper and a lower elevation association of this alliance exists locally. More plots are needed to substantiate this.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K111, 99S127, 99S138, 99S103, 99S109, 99S135

***Ptilagrostis kingii* Herbaceous Vegetation [Provisional]**

COMMON NAME

Sierran False Needlegrass Herbaceous Vegetation

SYNONYM

Shorthair Reedgrass Series

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Short alpine or subalpine sod grassland

ALLIANCE

Ptilagrostis kingii Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is known from the glaciated highlands of the central and southern Sierra Nevada (Potter, 2000 ms).

Yosemite and environs

Stands of this association have been sampled in the mapping area at Falls Ridge, Tuolumne Meadows, and Tioga Pass 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is subalpine to alpine and ranges from 8,500–11,000 feet elevation. Sites are seasonally saturated meadows formed along permanent streams as stringer meadows. Some sites occur in basins. This type is often found along small first to second order streams. However, more frequently stands are some distance from streams in elevated portions of meadows. Surfaces may be hummocky or linear.

Yosemite and environs

Stands of this association occur on flat to moderately sloping lower slopes along lakeshores, streams and wet meadows ranging from 8,550–9,560 feet elevation. Aspect does not seem to be important in differentiating this type. Slopes are gentle to flat. Sites are seasonally saturated. Soils are moderately well drained to somewhat poorly drained loams and silt loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis canadensis*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis canadensis*

VEGETATION DESCRIPTION

Globally

This association averages a total vegetative cover of close to 100 percent. Trees are usually absent and shrubs are averaging less than 6 percent. The only shrub of any cover is the subshrub *Vaccinium caespitosum*. *Ptilagrostis kingii* is the dominant, averaging 60 percent cover, followed by *Carex subnigricans* (18%), *Danthonia intermedia* (8%), *Carex pachystachya* (9%), and *Luzula oresteria* (5%). Forbs include *Antennaria* sp. (18%), *Oreostemma alpigenum* (15%), and several other species below 50 percent constancy.

Yosemite and environs

This dense palustrine grassland covers 80–90 percent of the surface on average and is usually strongly dominated by *Ptilagrostis kingii* (mean 70%). *Oreostemma alpigenum* is a constant at 5 percent, and *Polygonum bistortoides* averages 6 percent cover. *Calamagrostis breweri*, *Carex scopulorum* var. *bracteosa*, *Antennaria rosea*, *Gentiana newberryi*, *Castilleja lemmonii*, and *Trisetum spicatum*, among other species, contribute relatively low cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably relatively localized in the central and perhaps southern Sierra Nevada and of limited extent.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Although Sierran False Needlegrass Herbaceous Vegetation is generally found in association with *Calamagrostis breweri* and *Carex exserta* alliance stands, it has moister soil conditions than the latter and somewhat drier conditions than the previous alliance. Typically these are moderately wet stands compared to other meadow sites.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 98M103, 98M98, 98K109

NRI: 175

Potter: 1661, 1670

Potter (2000 ms): 10 plots outside of study area

***Danthonia intermedia* - *Antennaria rosea* Herbaceous Vegetation [Provisional]**

COMMON NAME	Intermediate oatgrass - pussy-toes Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural
FORMATION	Short bunch temperate or subpolar grassland

ALLIANCE Danthonia intermedia Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland to Palustrine

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Danthonia intermedia* - *Antennaria rosea* Herbaceous Vegetation were sampled in the mapping area of Yosemite and environs within the Dunderberg Peak, Vogelsang Peak and Tioga Pass 7.5 minute topographic quadrangles. Stands are likely found in portions of many subalpine meadow habitats throughout the park between 7,000 and 10,000 feet (Botti 2001).

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Danthonia intermedia* - *Antennaria rosea* Herbaceous Vegetation are found at mesic sites at high elevation (8,645–9,876 feet) on low slopes to basin floors of generally linear to mildly convex, gentle slopes. Exposures are variable ranging from northwest to south to east. These sites are often found on stream terraces and in meadows. Soils tend to be moderately well-drained to well-drained sandy loam to silt loam from granitic or metamorphic parent materials. Sites are seldom rocky with substrates dominated by relatively high cover of litter (10-50%) and bare soil (40-90%). Wood is scarce on these sites.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Danthonia intermedia*, *Antennaria rosea*, *Senecio scorzonella*, *Solidago multiradiata*, *Potentilla gracilis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Danthonia intermedia*, *Antennaria rosea*, *Muhlenbergia filiformis*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Danthonia intermedia* - *Antennaria rosea* Herbaceous Vegetation form a relatively dense herbaceous layer (70-90% herbaceous cover) consisting of a mix of herbaceous dicot and grass species. Shrub cover is sparse to nonexistent (0-20%); tree cover is typically present only in meadow-edge situations. *Danthonia intermedia* dominates stands with 37.5% mean cover. Other species providing significant cover include *Antennaria rosea* (15%), *Senecio scorzonella* (15%), *Solidago multiradiata* (15%), and *Potentilla gracilis* (15%). *Muhlenbergia filiformis* provides little cover (2.5%) but is a fairly consistent component. Other species with high frequency include *Calamagrostis breweri* (1.5%), *Perideridia parishii* (1.5%), and *Polygonum bistortoides* (0.5%). Other species with high frequency but low cover include *Trisetum spicatum* (0.5%). Additional species that may occasionally be found in these stands include *Fragaria virginia*, *Gentiana newberryi*, *Gentianopsis holopetala*, *Ivesia lycopodioides* and *Phleum alpinum*. Stands typically have high species diversity as indicated by the 47 species found in just the three stands sampled.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION May be widespread in the Sierra Nevada, Cascade Range and elsewhere in northern California but little information available

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=3)

USGS-NPS Veg Data: 98K87, 99S129, 99S132

Potter: 1659

Carex exserta - *Cistanthe* spp. (*Carex filifolia* var. *erostrata* - *Calyptidium* spp. , Hickman 1993) Herbaceous Vegetation

COMMON NAME	Shorthair Sedge – Pussypaws Species Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland

ALLIANCE *Carex (filifolia, exserta)* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite and from Rae Lakes in Kings Canyon National Park. It is expected throughout the subalpine zone of the central and southern Sierra Nevada. Information about its global range is not available without additional inventory.

Yosemite and environs

This association has been described from stands in Tuolumne Meadows.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are known from seasonally flooded basin floor meadows at about 8,500 feet of elevation. Soils are well drained sands and sandy loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex exserta* (= *Carex filifolia* var. *erostrata*)

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex exserta* (= *Carex filifolia* var. *erostrata*), *Cistanthe (monosperma, umbellata)* (= *Calyptridium [monospermum, umbellatum]*)

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This dry meadow grassland is heavily dominated by *Carex exserta* (= *Carex filifolia* var. *erostrata*) (19% cover), which forms a patchy canopy with other graminoids and forbs less than 0.5 meter in height. Associates are quite variable, but the forbs *Antennaria rosea* (0.5% cover) and a trace of at least one member of the genus *Cistanthe* (*monosperma*, *umbellata*) are usually present. Common graminoid associates providing traces of cover may include *Poa secunda*, *Achnatherum lemmonii*, *Agrostis variabilis*, and/or *Juncus parryi*. Most forb species are present only in traces, though *Lupinus breweri* (7.5% cover) may be locally common. Other forbs present in trace amounts may include *Oreostemma alpigenum* var. *alpigenum*, *Rumex paucifolius*, *Achillea millefolium*, *Gayophytum diffusum*, *Montia chamissoi*, *Penstemon rydbergii*, *Potentilla drummondii*, and/or *Streptanthus tortuosus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This association is placed in the *Carex (filifolia, exserta)* Herbaceous Alliance. Kartesz recognizes *Carex exserta* and *Carex filifolia* as separate taxa, while The Jepson Manual (Hickman 1993) maintains *Carex exserta* as a variety, *Carex filifolia* var. *erostrata*.

Yosemite and environs

This description is based upon plot data collected in 1998. Burke's work was not used because of taxonomy differences.

Plots used to describe association (n=2)

USGS-NPS Veg Data: 98M84, 98M101

***Carex exserta* (*Carex filifolia* var. *erostrata*, Hickman 1993) - *Trisetum spicatum* Herbaceous Vegetation [Provisional]**

COMMON NAME	Shorthair Sedge - Narrow False Oats Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland
ALLIANCE	<i>Carex (filifolia, exserta)</i> Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found at scattered locations in the alpine and subalpine regions east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this alpine and subalpine grassland are found between 8,700–11,500 feet of elevation on gentle to moderate slopes. Aspects are variable and do not seem to be diagnostic for this type. Stands are found on basin floors, lower to upper slopes. Soils are clay loams to silt loams derived from igneous or metamorphic parent materials.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex exserta* (= *Carex filifolia* var. *erostrata*), *Antennaria rosea*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex exserta* (= *Carex filifolia* var. *erostrata*), *Trisetum spicatum*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This subalpine to alpine meadow grassland is dominated by *Carex exserta* (= *Carex filifolia* var. *erostrata*) (20% cover) and *Trisetum spicatum* (5% cover). Associates are highly variable, but the most constant species are the forbs *Antennaria rosea* (4% cover) and *Solidago multiradiata* (4% cover). Graminoids, which provide traces of cover, may include *Danthonia intermedia*, *Poa secunda*, *Poa stebbinsii*, *Carex subnigricans*, *Carex breweri*, *Elymus elymoides*, and/or *Juncus patens*. Forb associates may include *Trifolium monanthum* (3% cover) and traces of *Antennaria media*, *Arenaria kingii*, *Castilleja nana*, *Eriogonum ovatum*, *Penstemon heterodoxus*, and/or *Potentilla drummondii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This association is placed in the *Carex (filifolia, exserta)* Herbaceous Alliance. Kartesz recognizes *Carex exserta* and *Carex filifolia* as separate taxa, while The Jepson Manual (Hickman 1993) maintains *Carex exserta* as a variety, *Carex filifolia* var. *erostrata*.

Yosemite and environs

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K134, 99S130, 99K149, 99K150

NRI: 237, 296

Potter (pers com 2002): has 3 additional plots outside study area

***Carex exserta* (*Carex filifolia* var. *erostrata*, Hickman 1993) - *Penstemon heterodoxus* Herbaceous Vegetation
[Provisional]**

COMMON NAME

Shorthair Sedge - Sierran Beardtongue Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Short alpine or subalpine sod grassland

ALLIANCE

Carex (filifolia, exserta) Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found near alpine lakes to the east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine grassland prefers open, stony, dry habitats between 10,000–11,000 feet of elevation. Aspects are generally south and west. Stands often grow on the upper margins of meadows or just beyond the zone of seasonal soil saturation if the stand is adjacent to a lake. Soils are well drained sands or loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex exserta* (= *Carex filifolia* var. *erostrata*)

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex exserta* (= *Carex filifolia* var. *erostrata*), *Penstemon heterodoxus*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this highly diverse and open alpine grassland occur on dry sites at the upper edges of meadows. Most stands occur as patches between rock outcrops or intergrade into *Pinus contorta* var. *murrayana* or *Pinus albicaulis* woodlands. *Carex exserta* (= *Carex filifolia* var. *erostrata*) dominates the stands with 20 percent cover. Ninety species have been recorded in stands of this association, though none contribute much cover. The forb *Penstemon heterodoxus* is diagnostic but only averages a trace of cover. Common graminoid associates include *Achnatherum nelsonii*, *Juncus parryi*, *Poa wheeleri*, *Poa stebbinsii*, *Trisetum spicatum*, and/or *Elymus elymoides*. Forb associates may include *Eriogonum incanum*, *Saxifraga aprica*, *Cistanthe umbellata*, *Gayophytum humile*, *Lupinus lepidus*, *Phlox diffusa*, *Phyllodoce breweri*, *Minuartia rubella*, and/or *Rumex paucifolius*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This association is placed in the *Carex* (*filifolia*, *exserta*) Herbaceous Alliance. Kartesz recognizes *Carex exserta* and *Carex filifolia* as separate taxa, while Jepson maintains *Carex exserta* as a variety, *Carex filifolia* var. *erostrata*.

Yosemite and environs

Plots used to describe association (n=10)

USGS–NPS Veg Data: 98K72, 98K77, 98K78, 99K120, 98K71, 98M77

NRI: 64, 78, 238

Potter: 1668

***Carex nigricans* - *Kalmia polifolia* Herbaceous Vegetation [Provisional]**

COMMON NAME	Black Alpine Sedge - Bog Laurel Herbaceous Vegetation
SYNONYM	Blackish Sedge - Mountain Laurel Association (Taylor, 1984)
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Seasonally flooded temperate or subpolar grassland

ALLIANCE *Carex nigricans* Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association may be widespread throughout the western United States. Similar stands have been documented in Washington, Oregon, and British Columbia (NatureServe online alliance vegetation descriptions, 2002).

Yosemite and environs

This association has been documented from the Gaylor Lakes Basin and the Harvey Monroe Hall Research Natural Area (Taylor, 1984), near Tioga Pass.

ENVIRONMENTAL DESCRIPTION

Globally

Vegetation within this association is found in moist subalpine and alpine meadows, snowbeds, lake margins, and other low-gradient depressions of the northern Rockies and Pacific ranges from 5,200–13,000 feet in elevation. These habitats are cold and snowy, with snowfields lingering into June or later. Soils are frigid, derived from bedrock or aggraded alluvium, usually high in organic matter, and strongly acidic. These communities are often associated with hummocky topography, which provides a juxtaposition of saturated and somewhat drained microhabitats. Water tables are often at or near the surface for much of the growing season, and organic decomposition is slow.

Yosemite and environs

This association is known from low-gradient basin floors and lake terraces at about 10,000 feet of elevation. Aspect is not diagnostic for this association. Soils are moderately well drained silt loams derived from igneous parent material.

MOST ABUNDANT SPECIES

Globally

Shrub	<i>Kalmia microphylla</i>
Herbaceous	<i>Carex</i> spp.

Yosemite and environs

Shrub	<i>Kalmia polifolia</i>
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Herbaceous *Carex exserta*, *Achnatherum lemmonii*, *Trichophorum clementis*

CHARACTERISTIC SPECIES

Globally

Shrub *Kalmia microphylla*
Herbaceous *Carex nigricans*

Yosemite and environs

Shrub *Kalmia polifolia*
Herbaceous *Carex nigricans*

VEGETATION DESCRIPTION

Globally

This association is typified by a dominant dwarf-shrub layer of *Kalmia microphylla*. Other ericaceous shrubs, including *Phyllodoce empetrifolmis*, *Phyllodoce breweri*, *Ledum glandulosum*, and *Vaccinium* spp., are common associates. Dwarf *Salix* spp. may also be present. The herbaceous layer is typically dominated by graminoids, of which Carices usually predominate. *Carex scopulorum*, *Carex aquatilis*, *Carex canescens*, and *Carex pellita* (= *Carex lanuginosa*) are especially common. Grasses, such as *Deschampsia caespitosa*, *Danthonia intermedia*, and *Phleum alpinum*, may also be locally abundant. Mesic forbs are usually scattered through the graminoid matrix including *Symphyotrichum spathulatum* (= *Aster occidentalis*), *Pedicularis groenlandica*, *Caltha leptosepala*, *Gentiana* spp., *Dodecatheon* spp., and *Epilobium* spp.

Yosemite and environs

This association is typified by a dominant dwarf-shrub layer of *Kalmia polifolia* (37% cover). Other ericaceous shrubs, including *Phyllodoce breweri* (0.5% cover) and *Vaccinium caespitosum* (37% cover), are common associates. Dwarf *Salix* spp. like *Salix arctica* and *Salix orestera* may also be present in trace amounts. The herbaceous layer is typically dominated by graminoids, of which Carices usually predominate. *Carex exserta* (15% cover), *Carex spectabilis* (2.5% cover), and *Carex nigricans* (2.5% cover) are especially common. The forb layer is sparse but includes small amounts of *Oreostemma alpigenum* var. *alpigenum*, *Antennaria media*, *Botrychium simplex*, *Castilleja lemmonii*, *Lupinus lepidus*, *Potentilla drummondii*, and/or *Saxifraga aprica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This association may be better placed in the *Kalmia microphylla* Saturated Dwarf-Shrubland Alliance.

Yosemite and environs

Plots used to describe association (n=1)

USGS-NPS Veg Data: 98M124

Carex scopulorum var. *bracteosa* - *Pedicularis groenlandica* Herbaceous Vegetation

COMMON NAME Holm's Stony Mountain Sedge - Bull Elephant's-Head Herbaceous Vegetation

SYNONYM None

PHYSIOGNOMIC CLASS Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS Perennial graminoid vegetation

PHYSIOGNOMIC GROUP Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Seasonally flooded temperate or subpolar grassland

ALLIANCE *Carex scopulorum* Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found at scattered alpine locations east of the Sierra Crest (Taylor, 1984).

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found in seasonally flooded basin floors, including tarn margins and low-gradient streambanks, at about 10,500 feet of elevation. Slopes are flat to very gentle, and soils are poorly drained with a lot of organic content.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite (Taylor, 1984). Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex scopulorum* var. *bracteosa*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex scopulorum* var. *bracteosa*, *Pedicularis groenlandica*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The seasonally flooded perennial grassland is dominated by *Carex scopulorum* var. *bracteosa* (37.5% cover). The graminoids *Eleocharis quinqueflora* (2.5% cover) and traces of *Carex subnigricans* may also be present. Forb cover is fairly high, totaling about 40 percent. *Pedicularis groenlandica* is diagnostic, achieving approximately 15 percent cover. Other common forb associates may include *Packera buekii* (= *Senecio cymbalarioides*) (15% cover), *Allium validum* (2.5% cover), *Gentiana newberryi* (2.5% cover), *Ivesia lycopodioides* (2.5% cover), and *Oreostemma alpigenum* var. *alpigenum* (2.5% cover) as well as traces of *Botrychium simplex*, *Castilleja lemmonii*, *Kalmia polifolia*, *Mimulus primuloides*, *Potentilla flabellifolia* and/or *Potentilla gracilis*. The shrub layer is sparse with only about 2.5 percent cover of *Salix planifolia*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Potter (pers com 2002) has a number of plots with *C. scopulorum* present but not with *Pedicularis groenlandica*. This suggests further variation in the Yosemite area, beyond Potter's sampling elsewhere in the Sierra Nevada.

Yosemite and environs

Plots used to describe association (n=1)

USGS-NPS Veg Data: 98M125

Carex scopulorum - *Eleocharis quinqueflora* Herbaceous Vegetation

COMMON NAME	Holm's Stony Mountain Sedge - Few-Flower Spikerush Herbaceous Vegetation
SYNONYM	<i>Eleocharis quinqueflora</i> - <i>Carex scopulorum</i> Herbaceous Vegetation
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Seasonally flooded temperate or subpolar grassland
ALLIANCE	<i>Carex scopulorum</i> Seasonally Flooded Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Palustrine

RANGE

Globally

This association has been described from stands in Nevada (Lake Tahoe Basin) and California.

Yosemite and environs

This association is found throughout montane and subalpine regions of the park and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Sites can occur in alpine and subalpine wet basins, stream terraces, ponds, cirque basins, and marshy meadows associated with seeps. Soils are always organic and wet or saturated throughout the summer.

Yosemite and environs

Stands of this association are found between 6,900–10,500 feet of elevation. Sites are meadows, stream terraces, and basins that are seasonally flooded. Aspect is not diagnostic for the type as slopes are very gentle to flat. Soils are poorly drained and have high organic content.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Eleocharis quinqueflora*, *Carex scopulorum*

Yosemite and environs

Herbaceous *Eleocharis quinqueflora*, *Carex scopulorum*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Eleocharis quinqueflora*, *Carex (scopulorum, aquatilis)*

Yosemite and environs

Herbaceous *Eleocharis quinqueflora*, *Carex scopulorum*

VEGETATION DESCRIPTION

Globally

This herbaceous wetland is typified by the codominance of *Carex scopulorum* and *Eleocharis quinqueflora* and the presence of surface water for extended periods during the growing season. Common graminoid associates may include *Carex scopulorum*, *Carex aquatilis*, *Carex buxbaumii*, *Carex utriculata*, *Deschampsia caespitosa*, and *Eleocharis rostellata*. Forb cover is low but can include *Caltha leptosepala*, *Pedicularis groenlandica*, *Oreostemma alpinum* (= *Aster alpigenus*), *Dodecatheon alpinum*, and *Polygonum bistortoides*.

Yosemite and environs

Stands of this association are codominated by *Carex scopulorum* (17% cover) and *Eleocharis quinqueflora* (14.5% cover) with a very diverse assortment of forbs and graminoids. Stands typically achieve between 80–90 percent total cover, and the canopy is less than 0.5 meter in height. The graminoid *Deschampsia caespitosa* (2.3% cover) has a 40 percent frequency, the highest of the associated graminoids in this type. *Carex* spp. are well represented but at low frequencies. The forbs most commonly found in stands of this vegetation include *Oreostemma alpinum* var. *alpigenum*, *Mimulus primuloides*, and/or *Polygonum bistortoides*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION The stands of this association are all known from the northern and central Sierra Nevada.

DATABASE CODE CEGL001837?

COMMENTS

Globally

This association is described as a member of the *Eleocharis quinqueflora* Seasonally Flooded Herbaceous Alliance in the USNVC.

Yosemite and environs

Plots used to describe association (n=7)

USGS–NPS Veg Data: 98K92, 98M66, 99K142, 99K143, 99K147, 99S145, 99S148

***Eleocharis quinqueflora* Herbaceous Vegetation**

COMMON NAME

Few-Flower Spikerush Herbaceous Vegetation

SYNONYM

***Eleocharis pauciflora* Herbaceous Vegetation**

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

PHYSIOGNOMIC FORMATION

Seasonally flooded temperate or subpolar grassland

ALLIANCE

Eleocharis quinqueflora Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This vegetation type is found in the upper subalpine and lower alpine in the western United States (NatureServe, 2002).

Yosemite and environs

Stands of this association are scattered throughout the park.

ENVIRONMENTAL DESCRIPTION

Globally

This vegetation type forms uniform peatland communities and is found in the upper subalpine and lower alpine in the western United States. Sites can occur in wet basins, stream terraces, ponds, cirque basins, and marshy meadows associated with seeps. Soils are always organic and wet or saturated throughout the summer.

Yosemite and environs

This association is found on basin floors, meadows, lakeshores, and stream terraces from 6,900–10,000 feet of elevation.

MOST ABUNDANT SPECIES

Globally

Herbaceous *Eleocharis quinqueflora*

Yosemite and environs

Herbaceous *Eleocharis quinqueflora*

CHARACTERISTIC SPECIES

Globally

Herbaceous *Eleocharis quinqueflora*

Yosemite and environs

Herbaceous *Eleocharis quinqueflora*

VEGETATION DESCRIPTION

Globally

The vegetation is characterized by a moderately dense to dense herbaceous layer that is dominated by *Eleocharis quinqueflora*. Common graminoid associates may include *Carex scopulorum* or *Carex aquatilis*. Other graminoids can include *Carex buxbaumii*, *Carex utriculata*, *Deschampsia caespitosa*, and *Eleocharis rostellata*. Forb cover is low but can include *Caltha leptosepala*, *Pedicularis groenlandica*, *Oreostemma alpinum* (= *Aster alpigenus*), *Dodecatheon alpinum*, and *Polygonum bistortoides*. Diagnostic of this herbaceous wetland alliance is the dominance or codominance of *Eleocharis quinqueflora* and the presence of surface water for extended periods during the growing season.

Yosemite and environs

This association is dominated by *Eleocharis quinqueflora* (33.5% cover) with *Oreostemma alpinum* var. *alpinum* (16.2% cover) an important species. Other common forb associates providing small amounts of cover may include *Polygonum bistortoides*, *Dodecatheon jeffreyi*, *Hypericum anagalloides*, and/or *Pedicularis attollens*. Many graminoids may be present at low cover and frequencies. The most common graminoid species include *Carex luzulifolia* (12.5% cover, 0.2 frequency), *Deschampsia caespitosa*, *Muhlenbergia filiformis*, and various other *Carex* and *Juncus* spp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4

RANK JUSTIFICATION

DATABASE CODE Cegl001836

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=5)

USGS-NPS Veg Data: 98K76, 98K80, 99S113, 99S117, 99S120

***Sparganium angustifolium* Herbaceous Vegetation [Provisional]**

COMMON NAME

Greenfruit Bur-Reed Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Hydromorphic-rooted vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar hydromorphic rooted vegetation

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION	Permanently flooded temperate or subpolar hydromorphic-rooted vegetation
ALLIANCE	<i>Sparganium angustifolium</i> Permanently Flooded Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Palustrine
RANGE	
Globally	This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. It is likely that this species forms monospecific associations in many parts of montane and boreal North America.
Yosemite and environs	
	This wetland association occurs on the margins of montane and subalpine lakes and ponds throughout the park.
ENVIRONMENTAL DESCRIPTION	
Globally	This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.
Yosemite and environs	
	Stands of this permanently flooded vegetation are found rooted in shallow ponds and lakes between 7,800–10,000 feet of elevation. Slopes are flat and soils are seasonally inundated, poorly drained mucks.
MOST ABUNDANT SPECIES	
Globally	This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.
Yosemite and environs	
Herbaceous	<i>Sparganium angustifolium</i>
CHARACTERISTIC SPECIES	
Globally	This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Sparganium angustifolium*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this vegetation are characterized by a sparse cover of hydromorphic-rooted plants emerging less than 1 meter from the water. Total vegetative cover is generally less than 20 percent. *Sparganium angustifolium* (13.7% cover) is the dominant forb, sometimes forming pure stands or with only one or two associates. Common associates occurring in trace amounts may include *Callitriche heterophylla* ssp. *bolanderi*, *Potamogeton natans*, *Callitriche palustris* (= *Callitriche verna*), *Carex spectabilis*, and/or *Utricularia macrorhiza* (= *Utricularia vulgaris*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=5)

USGS–NPS Veg Data: 98M102, 98M97, 99K103, 99K140, 98M100

***Penstemon newberryi*-*Streptanthus tortuosus*/*Selaginella watsonii* Herbaceous Vegetation [Provisional]**

COMMON NAME	Mountain pride penstemon-Mountain jewelflower/Watson spikemoss Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Low temperate or subpolar perennial forb vegetation
ALLIANCE	Penstemon Newberryi-Streptanthus Tortuosus Herbaceous Alliance [Provisional]
CLASSIFICATION CONFIDENCE LEVEL	2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from the Yosemite area. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Penstemon newberryi*-*Streptanthus tortuosus*/*Selaginella watsonii* Herbaceous Vegetation were sampled in the mapping area of Yosemite and environs within the Sing Peak, Tenaya Lake, and Tioga Pass 7.5 minute topographic quadrangles. It has been widely observed in open, granitic bedrock slabs and domes throughout Yosemite National Park.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Penstemon newberryi*-*Streptanthus tortuosus*/*Selaginella watsonii* Herbaceous Vegetation are found at xeric sites at high elevation (8,750–10,230 feet) on mid portions of linear to convex, gentle to moderately steep (12 - 23 degrees) slopes. Exposures are southerly, ranging from south to west. Stands are usually found on domes, bedrock outcrops and knobs. Soils are very poorly developed, well-drained to rapidly drained loamy sand from granitic parent materials. The amount of bedrock ranges from 2-50%, other rock cover adds an additional 13-45% cover, and leaf litter is almost negligible at 2-5% cover. Wood is scarce on these sites, and bare soil exposure is low at up to 16 percent.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Eriogonum nudum*, *Pellaea bridgesii*, *Selaginella watsonii*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Penstemon newberryi*

Herbaceous *Streptanthus tortuosus*, *Selaginella watsonii*, *Elymus elymoides*, *Eriogonum nudum*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Penstemon newberryi*-*Streptanthus tortuosus*/*Selaginella watsonii* Herbaceous Vegetation typically form linear stands along fractures in bedrock. *Penstemon newberryi* forms an intermittent canopy over diminutive forms of common, dry-site herbs including *Streptanthus tortuosus* (1.8%), *Elymus elymoides* (1.8%), *Eriogonum nudum* (6%), *Sedum obtusatum* (2.5%), and *Pellaea bridgesii* (2.5%). *Selaginella watsonii* may dominate stands in terms of cover (6%). *Juncus parryi* provides little cover (0.5%) but is a consistent component. Other species that may be present include *Poa*

secunda, *Triteleia ixioides*, *Achnatherum nelsonii*, *Cryptogramma acrostichoides*, *Spiraea splendens* [aka *S. densiflora*], *Pteryxia terebinthina* var. *terebinthina* and *Antennaria rosea*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably widespread in the Sierra Nevada and elsewhere in northern California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98M79, 98K84, 98K100

NRI: 244

SHRUB/SCRUB ASSOCIATIONS OF ECOLOGICAL ZONE IV:

Artemisia tridentata ssp. *vaseyana*/*Carex exserta* (*Carex filifolia* var. *erostrata*, Hickman 1993) Shrubland
[Provisional]

COMMON NAME	Mountain Big Sagebrush/Shorthair Sedge Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural /Seminatural
FORMATION	Microphyllous evergreen shrubland

ALLIANCE *Artemisia tridentata* ssp. *vaseyana* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association grows throughout the subalpine and lower alpine regions of the park and environs. Stands may occur on both the east and west side of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

Artemisia tridentata ssp. *vaseyana*-dominated shrublands occupy the coolest and moistest climate zone of the *Artemisia tridentata* shrubland complex. Associations often occur above the lower treeline as patches within montane or subalpine coniferous forests. The climate regime is cool, semiarid with yearly precipitation ranging from 25–60 centimeters. Much of the yearly precipitation falls as snow, which may cover the ground for long periods in winter. Temperatures are continental with large annual and diurnal variation.

Yosemite and environs

Stands of this association are found in the subalpine zone between 9,400–10,800 feet of elevation on basin floors and gentle to moderate lower slopes. Stands can occur on all aspects and prefer gentle slopes near meadow edges. The soils are moderate to deep silty loams. There may be a fair amount of stony, bare ground within stands.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
Graminoid	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata* ssp. *vaseyana*
Graminoid *Carex exserta* (= *Carex filifolia* var. *erostrata*)

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation forms an intermittent to continuous canopy less than 0.5 meter in height. *Artemisia tridentata* ssp. *vaseyana* is the dominant shrub codominating with moist site indicator graminoids, primarily *Carex exserta* (*C. filifolia* var. *erostrata*). *Vaccinium caespitosum* (0.5% cover) may also be present in the shrub canopy. Other graminoids and forbs commonly present include *Antennaria rosea* (2% cover), *Achnatherum nelsonii* (2% cover), *Hesperostipa comata* (0.8% cover), *Lupinus leucophyllus* (0.8% cover), *Danthonia intermedia* (0.5% cover), *Juncus mexicanus* (0.5% cover), *Hesperostipa comata* (0.5% cover), and/or *Poa stebbinsii* (0.5% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: In the fieldwork for this project, some confusion existed in the identification of *Artemisia rothrockii* and *Artemisia tridentata* ssp. *vaseyana*. Thus, the descriptions for these two alliances are probably somewhat compromised. It appears that *Artemisia tridentata* ssp. *vaseyana* is more likely to be the most common subalpine/alpine sagebrush in the mapping area, while *Artemisia rothrockii* is restricted to the volcanics and metamorphics of the east side of the crest.

Plots used to describe association (n=3)

USGS-NPS Veg Data: 98M89

NRI: 35, 233

Spiraea splendens/*Penstemon newberryi* - *Streptanthus tortuosus* Wooded Herbaceous Vegetation

COMMON NAME	Sierra spiraea/Mountain pride penstemon – Shieldplant Wooded Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Low temperate or subpolar perennial forb vegetation
ALLIANCE	<i>Penstemon newberryi</i> - <i>Streptanthus tortuosus</i> Wooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found at scattered alpine locations east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparse alpine association grows in cracks between granite slabs on poorly developed, sandy soils. Slopes are moderate to steep, and stands prefer mid to upper slope positions. Aspects are southeast to northwest.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Spiraea splendens</i> var. <i>splendens</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Spiraea splendens</i> var. <i>splendens</i>
Herbaceous	<i>Penstemon newberryi</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparse alpine and subalpine vegetation grows in cracks of granitic slabs in rapidly drained soils. The canopy is open and between 0.5–1 meter in height. Emergent individuals of *Pinus contorta* var. *murrayana* may be present. Forb and graminoid species are highly variable, but *Spiraea splendens* var. *splendens* (2% cover) is generally present. The graminoid *Elymus elymoides* (2% cover) may be common in some stands. Other graminoid associates may include *Juncus parryi* (1% cover) and traces of *Agrostis variabilis* and/or *Carex rossii*. The diagnostic forb *Penstemon newberryi* is usually present in small amounts. Other forbs present at trace amounts may include *Sedum obtusatum*, *Perideridia parishii*, and/or *Selaginella watsonii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

The position of this association within the USNVC should be evaluated.

Yosemite and environs

Plots used to describe association (n=7)

USGS–NPS Veg Data: 98M110, 98K98

NRI: 344, 302, 132, 305, 335

Taylor (1984) was also used

***Salix eastwoodiae* Seasonally Flooded Shrubland**

COMMON NAME

Sierran Willow Seasonally Flooded Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Deciduous shrubland

PHYSIOGNOMIC GROUP

Cold deciduous shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Seasonally flooded cold deciduous shrubland

ALLIANCE

Salix eastwoodiae Seasonally Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is found in the upper montane, subalpine, and alpine locations, predominantly occurring throughout the central and southern Sierra Nevada. Stands are generally moderate to large in size for riparian, often covering several acres (Potter, 2000).

Yosemite and environs

Stands of *Salix eastwoodiae* Seasonally Flooded Shrubland are sampled in the mapping area of Yosemite and environs within the Matterhorn Peak 15-minute, Tuolumne Meadows 15-minute, Hetch Hetchy Reservoir 15-minute, and Yosemite 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Salix eastwoodiae* Seasonally Flooded Shrubland are found adjacent to or near streambanks in mesic to wet meadows at mid to high elevations (6,920–11,000 feet). Slopes are gentle to moderate (5–20%). They often appear in basins or as stringer meadows with streams present. These sites are at the bottom of broad to very broad valleys with moderate upland slopes and variable valley bottom gradients. This association is often found near first order streams within the upper portions of mountain drainages. Slopes are usually convex in shape. Stands are formed on volcanic flows and glaciated granitic batholiths. The stands are seasonally to permanently saturated. Water typically is received by subsurface and overland flows from upstream slopes or upslope on a seasonal basis. Along streams, these stands can be seasonally flooded; however, the association does not appear to be significantly influenced by streamside disturbance (Potter, 2000).

Yosemite and environs

Stands of *Salix eastwoodiae* Seasonally Flooded Shrubland are found at mid to high elevations (7,700–10,400 feet) on moderate to somewhat steep slopes (11–28 degrees) with variable aspects.

MOST ABUNDANT SPECIES

Globally

Shrub	<i>Salix eastwoodiae</i> (Potter, 2000)
Herbaceous	<i>Oreostemma alpigenum</i> , <i>Deschampsia caespitosa</i> (Potter, 2000)

Yosemite and environs

Shrub	<i>Salix eastwoodiae</i>
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CHARACTERISTIC SPECIES

Globally

Shrub	<i>Salix eastwoodiae</i> (Potter, 2000)
Herbaceous	<i>Oreostemma alpigenum</i> var. <i>andersonii</i> , <i>Deschampsia caespitosa</i> (Potter, 2000)

Yosemite and environs

Shrub	<i>Salix eastwoodiae</i>
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VEGETATION DESCRIPTION

Globally

Stands of *Salix eastwoodiae* Seasonally Flooded Shrubland form a two-story structure with a moderately open to intermittent low to moderately tall shrub layer dominated by *Salix eastwoodiae*. The understory herbaceous layer can be well developed with openings in the shrub layer occur. A variety of species found in the herbaceous layer includes *Oreostemma alpigenum* (= *Aster alpigenus*), *Mimulus primuloides*, *Polygonum bistortoides*, *Allium validum*, *Perideridia parishii*, *Deschampsia caespitosa*, *Carex scopulorum*, *Trisetum spicatum*, *Carex subnigricans*, *Phleum alpinum*, *Calamagrostis breweri*, and *Calamagrostis canadensis*. Moss is commonly found in this association (Potter, 2000).

Yosemite and environs

Stands of *Salix eastwoodiae* Seasonally Flooded Shrubland form an open to continuous shrub layer dominated by *Salix eastwoodiae* and a well developed understory herbaceous layer. A variety of species are found in the herbaceous layer including *Allium validum*, *Thalictrum sparsiflorum*, *Phleum alpinum*, *Oreostemma alpigenum* var. *andersonii* (= *Aster*

alpigenus var. *andersonii*), *Perideridia parishii*, *Deschampsia caespitosa*, *Trisetum spicatum*, *Dodecatheon jeffreyi*, and *Descurainia californica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Numerous small stands probably occur through the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe this association (n=10)

NRI: 33, 76, 32

Potter: 1035, 1007, 1509, 1719, 1028, 1004, 1646

Taylor (1984)

***Salix orestera*/*Allium validum* Shrubland**

COMMON NAME Grayleaf Sierran Willow/Tall Swamp Onion Shrubland

SYNONYM None

PHYSIOGNOMIC CLASS Shrubland

PHYSIOGNOMIC SUBCLASS Deciduous shrubland

PHYSIOGNOMIC GROUP Cold deciduous shrubland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Temporarily flooded cold deciduous shrubland

ALLIANCE *Salix orestera* Seasonally Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is currently only known from the Tioga Pass area.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation grows on low-gradient basin floors, streamsides, and wet meadows around 10,500 feet of elevation. Soils are seasonally saturated clay loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Salix orestera</i>
Herbaceous	<i>Allium validum</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix orestera*
Herbaceous *Allium validum*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation forms a dense shrub canopy between 1–2 meters in height dominated by *Salix orestera* (87.5% cover). *Ribes montigenum* (2.5% cover) is the only other shrub which contributes any appreciable cover. The diagnostic forb is *Allium validum*, which contributes 2.5 percent cover, as does *Potentilla gracilis*. The herbaceous layer has several other forbs and graminoids that contribute only a trace of cover. These may include *Achillea millefolium*, *Cirsium* sp., *Mimulus primuloides*, *Montia chamissoi*, *Muhlenbergia filiformis*, *Oreostemma alpigenum* var. *alpigenum*, *Penstemon rydbergii*, *Phleum alpinum*, *Carex fissuricola*, *Carex spectabilis*, and/or *Trisetum spicatum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

More samples need to be found for this association.

Plots used to describe association (n=1)

USGS–NPS Veg Data: 98M91
Taylor (1984)

***Salix orestera*/Senecio triangularis Shrubland**

COMMON NAME	Grayleaf Sierran Willow/Arrowleaf Ragwort Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold deciduous shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Temporarily flooded cold deciduous shrubland
ALLIANCE	<i>Salix orestera</i> Seasonally Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite and from the Carson Pass Area of the northern Sierra. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found near lakes in the subalpine regions of the environs, near the crest of the Sierra.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association grows on the uplands on the margins of subalpine lakes between 9,500–10,500 feet of elevation. Stands prefer gentle to moderate slopes with east to northeast aspects. Soils are seasonally saturated sands to silt loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Salix orestera</i>
Herbaceous	<i>Senecio triangularis</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Salix orestera</i>
Herbaceous	<i>Senecio triangularis</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This shrubland forms a canopy between 0.5–2 meters in height dominated by *Salix orestera* (50% cover) with minor cover provided by *Phyllodoce breweri* and *Vaccinium caespitosum*. The herbaceous understory is heavily dominated by the diagnostic species *Senecio triangularis* (19% cover), with significant amounts of *Senecio scorzonella* (7.7% cover). *Arnica mollis* occurs in some stands with up to 18 percent cover. Other common herbaceous associates may include *Antennaria media* (1.5% cover), *Castilleja lemmonii* (0.5% cover), *Pedicularis attollens* (0.5% cover), and/or *Potentilla drummondii* (7.5% cover). Several graminoids occur in small amounts, though some stands may contain up to 8 percent cover of *Ptilagrostis kingii*. Other graminoids, which occur at about 1 percent cover, may include *Carex spectabilis*, *Poa stebbinsii*, *Trisetum spicatum*, *Ptilagrostis kingii*, *Carex exserta*, and/or *Luzula subcongesta*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=3)

USGS–NPS Veg Data: 98M116, 98M96

Potter: 1619

***Salix orestera/Calamagrostis breweri* Shrubland**

COMMON NAME **Grayleaf Sierran Willow/Shorthair Reedgrass Shrubland**

SYNONYM **None**

PHYSIOGNOMIC CLASS Shrubland

PHYSIOGNOMIC SUBCLASS Deciduous shrubland

PHYSIOGNOMIC GROUP Cold deciduous shrubland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Temporarily flooded cold deciduous shrubland

ALLIANCE *Salix orestera* Seasonally Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found near Tioga Pass.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This palustrine association grows at about 10,000 feet of elevation on flat to gently sloping, seasonally flooded basin floors. Soils are silt loams derived from metamorphic parent material.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix orestera*

Herbaceous *Antennaria rosea, Calamagrostis breweri*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix orestera*
Herbaceous *Calamagrostis breweri*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is characterized by an open shrub canopy less than 0.5 meter in height dominated by *Salix orestera* (15% cover). Some stands are codominated by *Vaccinium caespitosum*, with some *Pinus contorta* (2.5%). The fairly dense herbaceous understory is dominated by graminoids, primarily *Calamagrostis breweri* (37.5% cover). Other graminoids may be present including *Carex fissuricola* (2.5% cover) and *Ptilagrostis kingii* (2.5% cover), and small amounts of *Juncus parryi*, *Poa secunda*, and/or *Trisetum spicatum*. Forbs present may include *Antennaria rosea* (15% cover) and *Senecio scorzonella* (2.5% cover), and traces of *Symphyotrichum spathulatum* var. *spathulatum* (= *Aster occidentalis* var. *occidentalis*), *Castilleja lemmonii*, *Chamerion angustifolium* (= *Epilobium angustifolium*), and/or *Lupinus lepidus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Potter's description of this association has less cover of *Vaccinium caespitosum* and *Pinus contorta*.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99S159
Potter: 1563, 1620
Taylor (1984)

***Salix lemmonii* Shrubland [Provisional]**

COMMON NAME	Lemmon's Willow Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold deciduous shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Seasonally flooded cold deciduous shrubland

ALLIANCE *Salix lemmonii* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Palustrine (Semipermanently to Permanently Flooded)

RANGE

Globally

Stands of *Salix lemmonii* Shrubland are found in upper montane and subalpine locations throughout central and southern Sierra Nevada. They usually occur at moderate to large-sized stands but occasionally occupy streamside and lakeshore settings (Potter, 2000).

Yosemite and environs

Stands of *Salix lemmonii* Shrubland are sampled in the mapping area of Yosemite and environs within the Mammoth Mountain and Tioga Pass 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Salix lemmonii* Shrubland are found at mid to high elevations (6,200–9,000 feet) on gentle to somewhat steep slopes (4–47%) in meadows, on streambanks, along shores, and in seeps. Sites are often on bottoms of broad valleys with shallow upland slopes and occur in basins or as stringer meadows with streams present. They usually are adjacent to narrow first order streams indicative of upper portions of drainages. Microrelief is uniform and gently undulating. Meadows seasonally receive water by subsurface and overland flows from upstream of upslope sources. Some sites are semipermanently flooded, but most are dry at the surface in the summer. Streamside stands are seasonally or intermittently flooded, but stands within seeps are permanently saturated. This association does not appear to be significantly influenced by streamside disturbance. Soils are formed from granitic parent material deposited as alluvium in valley floors. They are often deep but less than 40 inches deep. Surface textures are loams and clays and subsurface textures are sandy clay loams. Drainage is poor to somewhat poor (Potter, 2000).

Yosemite and environs

Stands of *Salix lemmonii* Shrubland are found on gentle to steep, south- to southwest-facing slopes in basin floors, channel beds, and drainages. These sites are semipermanently to permanently flooded. Soils are poorly drained to very poorly drained with textures ranging from silt loam to muck. Parent material can be metamorphic or granitic. Litter cover can be high (65–70%) within this association.

MOST ABUNDANT SPECIES

Globally

Shrub *Salix lemmonii* (Potter, 2000)

Yosemite and environs

Shrub *Salix lemmonii*

CHARACTERISTIC SPECIES

Globally

Shrub *Salix lemmonii* (Potter, 2000)
Herbaceous *Mimulus guttatus* (Potter, 2000)

Yosemite and environs

Shrub *Salix lemmonii*

VEGETATION DESCRIPTION

Globally

Stands of *Salix lemmonii* Shrubland form a dense, moderately tall shrubland dominated by *Salix lemmonii*. Most associates in this stand are obligate and facultative wetland species. Understory species vary, but there is a high constancy of *Carex utriculata*. Other common species include *Mimulus guttatus*, *Perideridia parishii*, *Senecio triangularis*, *Lupinus latifolius*, *Oreostemma alpigenum* (= *Aster alpigenuus*), *Veratrum californicum*, *Achillea millefolium*, *Stachys albens*, *Viola macloskeyi*, and *Glyceria striata* (= *Glyceria elata*). This association is often adjacent to *Pinus contorta*, *Abies magnifica*, and *Pinus jeffreyi* forest alliance stands (Potter, 2000).

Yosemite and environs

Stands of *Salix lemmonii* Shrubland form an open three-story structure with an intermittent to continuous shrub layer and an open herbaceous layer. Emergent *Pinus contorta* may be present at 5–10 meters tall. The shrub layer is structured mostly 1–2 meters tall, and averages about 45 percent cover. This layer, dominated by *Salix lemmonii*, characterizes the association. The herb layer ranges from 5–30 percent at 0.5–1 meter tall. It commonly includes *Phleum alpinum*, *Potentilla gracilis*, *Allium validum*, *Epilobium ciliatum*, *Juncus drummondii*, *Polygonum bistortoides*, *Thalictrum fendleri*, and *Veronica wormskjoldii*. *Carex amplexans*, *Calamagrostis canadensis*, *Carex utriculata*, *Perideridia parishii*, and *Poa pratensis* are occasional. Other species contributing to minor cover may include *Aconitum columbianum*, *Arnica mollis*, *Symphyotrichum foliaceum* var. *apricum* (= *Aster foliaceus* var. *apricus*), *Carex heteroneura* var. *heteroneura*, *Lupinus polyphyllus*, *Mimulus guttatus*, mosses, *Platanthera leucostachya*, *Senecio triangularis*, and *Trifolium monanthum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=3)

USGS–NPS Veg Data: 98M108, 99K124, 99S142
Potter (2000) 21 plots outside study area.

***Salix melanopsis* Shrubland [Provisional]**

COMMON NAME	Dusky Willow Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold deciduous shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Seasonally flooded cold deciduous shrubland
ALLIANCE	<i>Salix melanopsis</i> Seasonally Flooded Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. The species occurs throughout much of the western United States and is likely to form stands elsewhere in its range.

Yosemite and environs

Stands of *Salix melanopsis* Shrubland are found throughout the mapping area of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Salix melanopsis* Shrubland are found at high elevations (approximately 9,900 feet).

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix melanopsis*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix melanopsis*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Salix melanopsis* Shrubland are dominated by *Salix melanopsis*. Other species that may be present include *Salix eastwoodiae*, *Allium validum*, *Symphyotrichum spathulatum* var. *spathulatum* (= *Aster occidentalis* var. *occidentalis*), *Salix planifolia* ssp. *planifolia*, *Lupinus burkei* ssp. *burkei* (= *Lupinus polyphyllus* var. *burkei*), *Hordeum brachyantherum*, and *Descurainia californica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association requires further substantiation within the study area.

Plots used to describe association (n=3)

Potter: 1568, 1566, 1567

***Holodiscus discolor*/Sedum obtusatum ssp. boreale - Cryptogramma acrostichoides Shrubland [Provisional]**

COMMON NAME Hillside Oceanspray/Sierran Stonecrop - American Rockbrake Shrubland

SYNONYM None

PHYSIOGNOMIC CLASS Shrubland

PHYSIOGNOMIC SUBCLASS Deciduous shrubland

PHYSIOGNOMIC GROUP Cold deciduous shrubland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Temperate cold deciduous shrubland

ALLIANCE *Holodiscus discolor* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found in scattered locations in the subalpine regions of the park east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found on steep midslopes between 8,200–10,000 feet. Aspects are east to south, and soils are silt loams to loamy sands derived from metamorphic or igneous parent material.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Holodiscus discolor</i>
Herbaceous	<i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Holodiscus discolor</i>
Herbaceous	<i>Sedum obtusatum</i> ssp. <i>boreale</i> , <i>Cryptogramma acrostichoides</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association forms an intermittent canopy between 0.5–5 meter in height. *Holodiscus discolor* (15% cover) dominates the shrub canopy with small amounts of *Leptodactylon pungens*, *Artemisia tridentata*, and/or *Artemisia rothrockii* usually present. *Cryptogramma acrostichoides* and *Sedum obtusatum* are the diagnostic herbaceous species, though neither contributes more than 1.5 percent cover. Other common herbaceous species present at very low cover values may include *Eriogonum nudum*, *Castilleja applegatei*, *Pellaea bridgesii*, *Penstemon newberryi*, *Achillea millefolium*, and/or *Streptanthus tortuosus*. Several graminoid species provide traces of cover including *Elymus elymoides*, *Achnatherum occidentale*, *Agrostis variabilis*, and/or *Juncus parryi*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: The taxon *Holodiscus discolor* has been treated taxonomically in various ways. The high mountain forms such as those included herein were once called *Holodiscus microphyllus*. These taxa have been recently subsumed into synonymy with *Holodiscus discolor*, which now includes low elevation coastal, midmontane, and subalpine to alpine forms.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99K109, 99K172, 99S161, 98K99

***Holodiscus discolor* - *Sambucus racemosa* Shrubland [Provisional]**

COMMON NAME	Hillside Oceanspray - European Red Elder Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold deciduous shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Temperate cold deciduous shrubland

ALLIANCE *Holodiscus discolor* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Only two stands of this vegetation are known from the Tenaya Lake and Virginia Lakes regions of the park.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The only known stands of this association are at 7,800 feet on a moderately steep southeast slope. The stand is on the upper slope of a stony outcrop with vegetation growing in cracks on loamy sand derived from igneous parent material.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Holodiscus discolor*, *Penstemon newberryi*, *Sambucus racemosa*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Holodiscus discolor*, *Sambucus racemosa*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparsely vegetated shrubland forms an open canopy 0.5 meter in height codominated by *Holodiscus discolor* (2.5% cover), *Penstemon newberryi* (2.5% cover), and *Sambucus racemosa* (2.5% cover). *Spiraea splendens* var. *splendens* (0.5% cover) rounds out the shrub canopy, and a few stunted individuals of *Pinus contorta* var. *murrayana* may be present. The herbaceous layer has several species with each a trace of cover including *Antennaria rosea*, *Cistanthe umbellata*, *Eriogonum incanum*, *Gayophytum humile*, *Hieracium horridum*, *Selaginella watsonii*, and/or *Viola purpurea*. Several graminoid species may be present in trace amounts including *Achnatherum latiglume*, *Achnatherum speciosum*, *Elymus elymoides*, *Juncus parryi*, and/or *Poa wheeleri*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This vegetation type needs more samples to confirm it as an association and to refine relationships with other types in the USNVC. It is likely to be closely related to the *Spiraea splendens* association of the *Penstemon newberryi* - *Streptanthus tortuosus* alliance.

Plots used to describe association (n=2)

USGS-NPS Veg Data: 98K41, 98K93

***Vaccinium caespitosum*/*Carex exserta* (*C. filifolia* var. *erostrata*, Hickman 1993) Dwarf-Shrubland [Provisional]**

COMMON NAME Dwarf Blueberry/Threadleaf Sedge Dwarf-Shrubland

SYNONYM None

PHYSIOGNOMIC CLASS Dwarf-shrubland

PHYSIOGNOMIC SUBCLASS Deciduous dwarf-shrubland

PHYSIOGNOMIC GROUP Cold deciduous dwarf-shrubland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Caespitose cold deciduous dwarf-shrubland

ALLIANCE *Vaccinium* (*caespitosum*, *scoparium*) Dwarf-Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Vaccinium caespitosum*/*Carex exserta* Dwarf-Shrubland are found at higher elevations in the mapping area of Yosemite and environs and were sampled within the Tioga Pass 7.5-minute topographic quadrangle and Tuolumne Meadows 15-minute topographic quadrangles. These stands are often in association with *Pinus contorta* var. *murrayana* mesic associations.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Vaccinium caespitosum*/*Carex exserta* Dwarf-Shrubland are found at high elevations (9,100–9,900 feet) on moist sites. This association is found on soils with textures ranging from loam to silt loam. Soils are moderately well drained to somewhat poorly drained. Litter cover can be high (58–80% cover). Slopes are typically gentle and aspect is variable.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Vaccinium caespitosum</i>
Herbaceous	<i>Carex exserta</i> (<i>C. filifolia</i> var. <i>erostrata</i>)

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Vaccinium caespitosum</i>
Herbaceous	<i>Carex exserta</i> (<i>C. filifolia</i> var. <i>erostrata</i>)

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Vaccinium caespitosum*/*Carex exserta* Dwarf-Shrubland form an intermittent shrub layer dominated by *Vaccinium caespitosum* and an open herb layer characterized by *Carex exserta*. *Antennaria rosea*, *Solidago multiradiata*, *Castilleja lemmonii*, and *Oreostemma alpigenum* var. *alpigenum*, are often present but contribute to minor cover. A variety of other species are occasionally found contributing to minor cover in this association including *Poa stebbinsii*, *Calamagrostis breweri*, *Botrychium simplex*, *Carex rossii*, *Danthonia intermedia*, *Danthonia unispicata*, *Luzula congesta*, *Pedicularis attollens*, *Ptilagrostis kingii*, and *Saxifraga aprica*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: This association is tentative and is clearly related to the *Carex (filifolia, exserta)* Herbaceous Alliance and the *Calamagrostis breweri* Alliance. It is distinguished by its strong dominance by *Vaccinium caespitosum*.

Plots used to describe association (n=4)

USGS-NPS Veg Data: 98M99, 99K148

Potter: 1669, 1648

***Vaccinium uliginosum* Dwarf-Shrubland**

COMMON NAME

Bog Blueberry Dwarf-Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Dwarf-shrubland

PHYSIOGNOMIC SUBCLASS

Deciduous dwarf-shrubland

PHYSIOGNOMIC GROUP

Cold deciduous dwarf-shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Saturated cold deciduous dwarf-shrubland

ALLIANCE

Vaccinium uliginosum Saturated Dwarf-Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. It is likely to range throughout the Sierra Nevada. Similar if not identical stands have been seen in the northern Sierra Nevada in Bucks Lake Wilderness and in the subalpine zone of Kings Canyon National Park (Charlotte Lake area).

Yosemite and environs

Stands of *Vaccinium uliginosum* Dwarf-Shrubland are sampled in the mapping area of Yosemite and environs within the Yosemite, Hetch Hetchy Reservoir, and Tuolumne Meadows 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Vaccinium uliginosum* Dwarf-Shrubland are found at midelevations (6,900–8,100 feet). They occur in saturated to seasonally wet meadows and streamsides usually on gently sloping to relatively flat terrain. Microrelief is often hummocky.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Vaccinium uliginosum*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Vaccinium uliginosum*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Vaccinium uliginosum* Dwarf-Shrubland are dominated by *Vaccinium uliginosum*. *Pinus contorta* and *Abies magnifica* may be occasionally found in the overstory. The shrub layer of *Vaccinium uliginosum* is diagnostic. Other shrubs are less abundant and may include *Ledum glandulosum*, *Salix planifolia* ssp. *planifolia*, and *Salix lemmonii*. Herbaceous species include *Oxypolis occidentalis*, *Polygonum bistortoides* (= *Bistorta bistortoides*), *Perideridia bacigalupii*, *Phalacroseris bolanderi*, *Mimulus primuloides*, *Agrostis idahoensis*, *Carex rossii*, *Carex nudata*, *Juncus macrandrus*, *Juncus nevadensis*, and *Juncus drummondii*. Moss (*Sphagnum* spp.) is often present at this association.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2G3?

RANK JUSTIFICATION Tends to occupy meadows that have not had any heavy grazing and restricted to saturated, relatively flat settings. These combined situations are now relatively rare in the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association prefers the margins of wet meadows in the Zones III and IV. It often is associated with high cover of *Sphagnum* spp.

Plots used to describe association (n=3)

Potter: 1610, 1034, 1721

FORESTS AND WOODLANDS OF ECOLOGICAL ZONE IV

***Pinus contorta* var. *murrayana* Forest**

COMMON NAME	Murray Lodgepole Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus contorta</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	1
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is widespread at higher elevations of the Sierra Nevada. This association is found at the highest elevations of the upper montane, often sharing this position with *Abies magnifica* - *Pinus monticola* - *Pinus contorta* var. *murrayana* Forest. Together, they straddle the Sierra Nevada Crest at higher elevations. Stands can cover extensive areas, but most are less than 100 acres due to natural fragmentation of the landscape.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Elevations are mostly above 8,500 feet and aspects are variable. Slopes range from gentle to somewhat steep but are predominantly moderate or gentle. The association typically occurs on the lower portions of slopes or on benches. Soils are derived from igneous rocks, primarily granite, but also pumice, rhyolite, and andesite, and have sandy loam or gravelly loam textures. Soils are typically well drained but may be excessively drained. Sites are characterized by significantly higher levels of surface gravel as compared to other associations in the upper montane of the Sierra Nevada. Litter cover is also generally high.

Yosemite and environs

In Yosemite and environs, this association occurs between 7,100–10,300 feet. Aspects are variable, though primarily western, southwestern, and southern, and slopes are gentle to somewhat steep. Soils are derived from granite and range from sandy loam to gravelly sand.

MOST ABUNDANT SPECIES

Globally

Tree *Pinus contorta* var. *murrayana*

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*

CHARACTERISTIC SPECIES

Globally

Tree *Pinus contorta* var. *murrayana*

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*

VEGETATION DESCRIPTION

Globally

Stands of this association are moderately dense forests with open understories. Tree cover is moderate, averaging 59 percent cover. Tree overstories are dominated by *Pinus contorta* var. *murrayana* with very scattered *Abies magnifica*. *Pinus monticola* is a rare member of the stand. The shrub layer is essentially absent, averaging less than 1 percent, although *Ribes montigenum* occurs in widely scattered locations indicating moist conditions. Cover of herbaceous dicots is among the lowest in the upper montane associations, averaging 3 percent; the species represent a mix of moderate to dry conditions (e.g., *Arabis platysperma* indicating drier sites and *Pyrola picta* and *Thalictrum fendleri* indicating moister sites). Herbaceous monocots average 10 percent cover, with *Carex rossii* indicating moister conditions and *Achnatherum occidentale* indicating drier conditions. Conifer regeneration is moderate, dominated by *Pinus contorta* var. *murrayana*, with generally more than 250 seedlings per acre.

Yosemite and environs

In Yosemite and environs, tree cover averages approximately 60 percent (31–72%), almost completely composed of *Pinus contorta* var. *murrayana*, with very scattered *Abies magnifica* and *Tsuga mertensiana*. As with the global range, the shrub cover is essentially absent and the herb layer generally less than 10 percent cover and composed of variable species.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This is probably a widespread type covering many thousands of acres in the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Note that the national classification would tend to call this and other forests with open and uncharacteristic understory as "sparsely vegetated" understories. The formal name for this association will probably be *P. contorta* var. *murrayana*/sparse understory forest (M. Reid pers com 2002).

Yosemite and environs

Probably the most extensive of the lodgepole pine forests in the Sierra Nevada.

Plots used to describe association (n=29)

USGS–NPS Veg Data: 98MCHS1

NRI: 289, 60, 112

Wieslander: 560, 528, 532, 514, 516, 462, 465, 344, 360, 382, 317, 330, 241, 249, 254, 261, 236, 237, 238, 239, 169, 111, 25, 27, 366

Potter (1998) 8 plots outside of study area

***Pinus contorta* var. *murrayana*/Ligusticum grayi Forest**

COMMON NAME	Sierra Lodgepole Pine/Sheep Wild Lovage Forest
SYNONYM	<i>P. contorta</i>/Thalictrum fendleri (Taylor, 1984) in part
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pinus contorta* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Pinus contorta/Ligusticum grayi Forest has a wide distribution in the Sierra Nevada (Potter, 1998).

Yosemite and environs

Stands of *Pinus contorta*/Ligusticum grayi Forest are found at higher elevations on both slopes of the range and were sampled within the Matterhorn Peak and Hetch Hetchy Reservoir 15-minute topographic quadrangles and in the Sing Peak and Tiltill Mountain 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Pinus contorta/Ligusticum grayi Forest is found at high elevations (6,660–8,920 feet) on low slopes and benches. Aspect is variable but often northwestern and northeastern. This association is found on gentle to somewhat steep (3–32%) slopes. The microtopography tends to be hummocky and broken. Soils are poorly drained to well drained with textures ranging from sandy loam to sandy clay loam derived from granitic parent material. Soil depths are moderately deep to deep (22 to greater than 40 inches). Bare soil, gravel, and rock cover tend to be minimal (0–4%, 0–6%, and 0–25% cover, respectively) (Potter, 1998).

Yosemite and environs

Stands of *Pinus contorta*/Ligusticum grayi Forest are found at mid to high elevations (6,100–9,300 feet). Aspect is variable; however, it tends to be south, west, and southeast. This association is found on flat to somewhat steep (0–18 degrees) slopes. Soils are generally loamy and range from sandy, gravelly loam, to loam. Parent material is granitic. Soils are well drained to moderately well drained with depths that are moderately deep to deep. These sites usually experience low levels of disturbance. Evidence of fire was common in the sampled stands.

MOST ABUNDANT SPECIES

Globally

Tree *Pinus contorta*, *Abies magnifica*

Yosemite and environs

CHARACTERISTIC SPECIES

Globally

Tree *Pinus contorta*, *Abies magnifica*
Herbaceous *Ligusticum grayi*

Yosemite and environs

Tree *Pinus contorta*
Herbaceous *Ligusticum grayi*

VEGETATION DESCRIPTION

Globally

Stands of *Pinus contorta*/*Ligusticum grayi* Forest form a continuous forest dominated by *Pinus contorta*, but *Abies magnifica* is often present. The dense understory is typically continuous with the occasional *Ribes montigenum* and *Ribes roezlii* (= *Grossularia roezlii*) in the shrub layer. The lush herbaceous layer typically is composed of *Ligusticum grayi*, *Orthilia secunda*, *Perideridia parishii*, *Senecio triangularis*, *Osmorhiza berteroi* (= *Osmorhiza chilensis*), *Veratrum californicum*, *Poa bolanderi*, and *Luzula comosa* (Potter, 1998).

Yosemite and environs

Stands of *Pinus contorta*/*Ligusticum grayi* Forest form a dense forest dominated by *Pinus contorta*, but *Abies magnifica* is often important in the overstory. Rarely are *Abies concolor*, *Populus tremuloides*, and *Pinus jeffreyi* present in the tree layer. The understory is usually densely covered with a large variety of herbs, which may include *Carex* sp., *Juncus* sp., *Senecio triangularis*, *Veratrum californicum*, *Thalictrum fendleri*, *Polygonum bistortoides* (= *Bistorta bistortoides*), and *Poa wheeleri*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably widespread mesic association of the *Pinus contorta* alliance in California.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type includes the Taylor (1984) *Pinus contorta*/*Thalictrum fendleri* association (identified in the interim classification), as this appears to be a more synoptic view of the association with a wider area sampled.

Plots used to describe association (n=25)

NRI: 189, 258, 11, 101, 190, 192, 193, 196, 340, 336, 109, 9, 108

Wieslander: 79, 171, 155, 124, 119, 121, 8, 11, 162, 195, 708, 736

Potter (1998) 23 plots outside of study area

***Pinus contorta* var. *murrayana* Woodland**

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

Sierra Lodgepole Pine Woodland

None

Woodland

Evergreen woodland

Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus contorta* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2
USFWS WETLAND SYSTEM Upland

RANGE

Globally

Stands of *Pinus contorta* Woodland are found throughout the central and southern Sierra Nevada (Potter, 1998).

Yosemite and environs

Stands of *Pinus contorta* Woodland are sampled in the mapping area of Yosemite and environs within the Sing Peak 7.5-minute and Matterhorn Peak, Tuolumne Meadow, and Merced Peak 15-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Pinus contorta* Woodland are found at mid to upper elevations (7,400–9,000 feet) on all aspects. This association is found on gentle to moderate slopes that are 5–30 percent. This association is often on lower slopes and benches; however, a high portion is also on broad somewhat rounded ridge tops and a few occur on midslopes. Bare ground and surface gravel are higher at this association and litter cover is lower compared to other nearby associations. Microrelief is usually uniformly smooth; however, sites are occasionally hummocky due to large surface rocks. Soils are typically sandy and derived from granite; however, these soils are formed from pumice cinders and ash near Mammoth Mountain. Soil depths are between 25 and 35 inches. Coarse fragments are relatively low, and drainage is usually excessive (Potter, 1998).

Yosemite and environs

The *Pinus contorta* Woodland is found at mid to high elevations (8,100–10,000 feet) on gentle to steep slopes (0–27 degrees). Aspect varies from southeast to northwest but is often east, southwest, or west. These sites are usually stony (72–85% rock cover) with soil textures that range from stony to loamy. Soils are well drained to moderately well drained, and soil depths are shallow to deep. Parent material is granitic. Fire is uncommon and disturbance tends to be low at these sites.

MOST ABUNDANT SPECIES

Globally

Tree *Pinus contorta* var. *murrayana*, *Abies magnifica* (Potter, 1998)

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*

CHARACTERISTIC SPECIES

Globally

Tree *Pinus contorta* var. *murrayana*, *Abies magnifica* (Potter, 1998)

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*

VEGETATION DESCRIPTION

Globally

Stands of *Pinus contorta* var. *murrayana* Woodland are open woodlands with a scattered understory of herbs. Tree cover is scattered and in patches. The overstory is characterized by open *Pinus contorta* usually with scattered *Abies magnifica*. The shrub layer is essentially missing or occurs at very low levels. The herbaceous layer is composed of *Cistanthe umbellata* var. *caudicifera* (= *Calyptridium umbellatum* var. *caudiciferum*), *Pedicularis semibarbata*, *Arabis*

platysperma, *Eriogonum nudum*, *Gayophytum eriospermum*, *Elymus elymoides* ssp. *californicus*, and *Achnatherum occidentale* ssp. *californicum*. Regeneration is dominated by *Abies magnifica*; however, *Pinus contorta* is also present (Potter, 1998).

Yosemite and environs

Pinus contorta var. *murrayana* Woodland is characterized by an open to intermittent overstory tree layer dominated by *Pinus contorta*. Occasionally, *Abies magnifica* and *Pinus monticola* will contribute minor overstory cover. *Arctostaphylos nevadensis* and *Quercus vaccinifolia* are occasionally in the open understory shrub layer. The herb layer is often sparse and may include *Juncus parryi*, *Penstemon newberryi*, *Achnatherum occidentale* ssp. *occidentale*, *Carex rossii*, *Carex exserta* (= *Carex filifolia* var. *erostrata*), *Poa secunda*, *Calochortus leichtlinii*, *Holodiscus discolor*, *Phyllodoce breweri*, *Ribes* sp., *Ribes montigenum*, *Phlox diffusa*, *Sedum obtusatum*, and *Eucephalus breweri* (= *Heterotheca breweri*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Probably a common type of open subalpine woodland in the central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

In the national classification, the sparse understory component would be identified as a character of the name and thus the formal name might be *Pinus contorta* var. *murrayana*/sparse understory woodland.

Yosemite and environs

Note: In NRI data, this is a heterogeneous lot with some fitting into Potter's (1994) *Pinus contorta* woodland association. Also note that this is less than 60 percent tree cover on average and would fall into a *Pinus contorta* Woodland Alliance in the USNVC. Currently, this association is easily differentiated from the other open woodland in the study area, *P. contorta* var. *murrayana*/*Carex exserta* (*C. filifolia* var. *erostrata*), by the lack of significant understory of *C. exserta* and the typical presence of *Abies concolor* in at least the reproduction layer.

Plots used to describe association (n=22)

NRI: 252, 185, 199, 253, 165, 360, 182

Wieslander: 594, 533, 534, 522, 524, 398, 399, 400, 408, 334, 271, 272, 277, 103, 94

Pinus contorta var. *murrayana*/*Penstemon newberryi* Sparse Vegetation

COMMON NAME	Sierra Lodgepole Pine/Pride-of-the-Mountains Sparse Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural

FORMATION Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pinus contorta* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is a sparsely wooded version of *Penstemon newberryi* - *Streptanthus tortuosus* Alliance that is also known from the Harvey Monroe Hall Research Natural Area, Inyo National Forest, California (Taylor, 1984).

Yosemite and environs

Stands of *Pinus contorta*/*Penstemon newberryi* Forest are found in Ecological Zone IV of the mapping area.

ENVIRONMENTAL DESCRIPTION

Globally

This association is a sparsely wooded version of *Penstemon newberryi* - *Streptanthus tortuosus* Alliance that is also known from the Harvey Monroe Hall Research Natural Area, Inyo National Forest, California (Taylor, 1984). It occurs on glaciated granitic and metamorphic substrate that has very poor soil development.

Yosemite and environs

Pinus contorta/*Penstemon newberryi* Forest is found at high elevations (8,600–9,700 feet) on moderately steep to somewhat steep slopes (10–20 degrees) that are generally convex in shape. Aspect varies from northeast to west but tends to be west facing. These sites are usually shallow, well drained soils formed on granitic parent material. Soils are generally poorly developed and stony with textures ranging from stony and gravelly to stony, gravelly, sandy loam.

MOST ABUNDANT SPECIES

Globally

No species are abundant in this association due to the sparse nature of all structural layers.

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*

CHARACTERISTIC SPECIES

Globally

This association is a sparsely wooded version of *Penstemon newberryi* - *Streptanthus tortuosus* Alliance that is also known from the Harvey Monroe Hall Research Natural Area, Inyo National Forest, California (Taylor, 1984).

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*

Herbaceous *Penstemon newberryi*

VEGETATION DESCRIPTION

Globally

This association is a sparsely wooded version of *Penstemon newberryi* - *Streptanthus tortuosus* Alliance that is also known from the Harvey Monroe Hall Research Natural Area, Inyo National Forest, California (Taylor, 1984).

Yosemite and environs

Stands of *Pinus contorta*/*Penstemon newberryi* Forest are characterized by an open overstory tree layer dominated by *Pinus contorta*. Rarely, *Pinus monticola* is found contributing minor cover to the tree layer. The herb layer is also open. *Penstemon newberryi* is constant in the understory based on field verification. However, no supporting herbaceous data are available from Wieslander plots. *Juncus* sp. (probably mostly *Juncus parryi*) is often present and *Carex* sp. is occasionally present. A variety of other species may be found contributing to minor cover in the understory shrub and

herbaceous layers including *Arctostaphylos nevadensis*, *Chrysolepis sempervirens*, *Quercus vaccinifolia*, *Antennaria media* (= *Antennaria alpina* var. *media*), *Spiraea splendens* (= *Spiraea densiflora*), *Holodiscus discolor*, and *Eriogonum umbellatum* var. *umbellatum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION May not be particularly common; restricted to glaciated outcrops within upper reaches of *Pinus contorta* alliance zone in the central and perhaps southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

This association is not a forest or a woodland but is characterized and defined by *P. contorta* var. *murrayana*. It would not be considered part of the same alliance as other forested *P. contorta* stands in the study area, but is included herein to reduce proliferation of additional alliances defined by the same nominate species (in this case, *P. contorta* var. *murrayana*).

Yosemite and environs

This type is split from *Pinus contorta* woodland (Potter, 1998) based on the extremely open nature of the stands; more like a sparsely wooded version of *Penstemon newberryi* - *Streptanthus tortuosus* Alliance (Taylor, 1984), ecologically intermediate between that alliance and *Pinus contorta* woodland of Potter (1994).

Plots used to describe association (n=5)

Wieslander: 758, 740, 724, 617, 397

***Pinus contorta* var. *murrayana* - *Artemisia tridentata* Forest**

COMMON NAME	Murray Lodgepole Pine/Big Sagebrush Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus contorta</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland
RANGE	

Globally

The alliance is widespread in the upper montane and subalpine zone of most major mountain ranges of the western United States. The association occurs predominantly on the east side of the Sierra Nevada at middle to upper elevations near the Sierra Crest. Stands occur on the west side of the crest on drier substrates and on edges of well drained meadows in the subalpine zone. Along with the *Pinus contorta* var. *murrayana* and *Abies magnifica* - *Pinus monticola* associations, these are the stands in the upper montane forest that transition into subalpine vegetation at still higher elevations. Stands can cover extensive areas but usually are less than 50 acres due to landscape fragmentation.

Yosemite and environs

This association appears to be uncommon in Yosemite and environs. Plots are sampled in the Virginia Lakes area of the east side and Tenaya Lake area of the west side. It is likely that most stands are on the east side of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

Elevations typically are above 8,500 feet, and preferred aspects are southeast and southwest. Stands are often located on moderate to somewhat steep slopes, generally on the middle and lower portions of a slope, but sometimes on upper slopes and on broad ridge tops. In comparison to other upper montane associations, this has significantly higher levels of surface gravel and shallower litter depths.

Yosemite and environs

This association is found on lower to midmountain slope positions from 8,100–9,200 feet in elevation. Slopes are gentle to somewhat steep with eastern aspects. Soils are somewhat poorly drained to moderately drained with loamy sand and sandy loam textures. They are derived from granite bedrock. Litter/Duff cover averages 45 percent.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Artemisia tridentata</i>

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Artemisia tridentata</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Artemisia tridentata</i>

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Artemisia tridentata</i>

VEGETATION DESCRIPTION

Globally

Stands of *Pinus contorta* var. *murrayana*/*Artemisia tridentata* Forest are open woodlands with a shrubby understory of *Artemisia tridentata*. Tree cover is low as compared to many other sites in the Sierra forests, and trees tend to occur as scattered clumps and individuals. Stands are dominated by *Pinus contorta* var. *murrayana*, with an average 31 percent cover in the tree overstory. *Abies magnifica* is often present with an average 21 percent cover in the tree overstory layer, but in many cases, *Pinus contorta* is the only component of the overstory; *Abies magnifica* occurs only as widely scattered individuals in the understory. An open shrub layer dominated by *Artemisia tridentata*, which averages 18 percent cover, characterizes understories. Both the shrub and herbaceous layers are substantially higher than most other Sierra forests, and the herbaceous layer is among the highest in the upper montane of the Sierra Nevada.

Yosemite and environs

The tree layer is composed solely of *Pinus contorta* var. *murrayana*, with cover averaging 39 percent in the 5–35 meter height range, while the shrub layer, composed primarily of *Artemisia tridentata*, averages 19 percent cover. Other shrubs, making up less than 2 percent cover, include *Chrysolepis sempervirens*, *Leptodactylon pungens*, and *Purshia tridentata*. The herbaceous layer averages 7 percent cover; the most frequent species are *Arabis inyoensis*, *Arabis platysperma*, and *Elymus elymoides*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably relatively common on the east side, but data to substantiate are currently lacking. Potter's (1994) sample size is only 11 for the entire range.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Probably mostly found in the Lundy Canyon, Lee Vining Canyon, and Virginia Lakes regions, locally.

Plots used to describe association (n=2)

USGS–NPS Veg Data: 98M53, 99K110

***Pinus contorta* var. *murrayana*/Ledum glandulosum Forest**

COMMON NAME	Murray Lodgepole Pine/Western Labrador tea Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus contorta</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Palustrine

RANGE

Globally

Although the alliance is widespread in the upper montane and subalpine zone of most major mountain ranges of the western United States, this association has only been described from Yosemite and environs. Taylor (1984) originally

described it for the Hall Research Natural Area within the environs of the study area. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is localized in Yosemite and environs in moist to hydric sites in the subalpine zone.

ENVIRONMENTAL DESCRIPTION

Globally

This association is described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory. Taylor (1984) describes this association as the most mesic of the three *Pinus contorta* associations he defined from the Hall RNA.

Yosemite and environs

This association is found along small streams and on the edges of meadows, or on slightly higher elevations in meadows, from approximately 7,700–9,000 feet in elevation on flat to gentle slopes of variable aspects. Microtopography is sometimes hummocky with *Ledum* and pines growing on slightly elevated portions of more saturated surrounding terrain. Soil textures range from silty loam of granitic origin to muck. Soils are somewhat poorly drained to poorly drained. Litter/Duff cover ranges from 20–95 percent. Sites are palustrine.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Ledum glandulosum</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Ledum glandulosum</i>

VEGETATION DESCRIPTION

Globally

This association is only known Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The tree layer is composed almost solely of *Pinus contorta* var. *murrayana*, averaging 15–20 meters in height and about 20 percent cover. *Ledum glandulosum* provides an average of 47 percent cover in the shrub layer, which is generally 0.5–1 meter. Other (sub)shrubs include *Spiraea splendens* var. *splendens*, *Vaccinium uliginosum*, and *Kalmia polifolia*; *Pinus contorta* var. *murrayana* saplings are also present in the shrub layer. The herb layer is variable, with *Chamerion angustifolium* (= *Epilobium angustifolium*), *Perideridia parishii*, *Calamagrostis canadensis*, *Deschampsia caespitosa*, and *Carex utriculata* providing most of the cover in this layer. There are another 62 mostly wetland meadow species included in the plot summaries, but most of them average only trace cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3?

RANK JUSTIFICATION At this time only known from Yosemite, however, suspected of being in Sequoia and Kings Canyon national parks and other areas of the High Sierra Nevada. Generally restricted to moist subalpine riparian and other palustrine settings.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association is related to *Pinus contorta* var. *murrayana*/*Vaccinium uliginosum* Forest. However, *Ledum glandulosum* appears to be more shade tolerant and more likely to occur in slightly drier and/or more well drained settings than *Vaccinium uliginosum*. The lower cover of moss in this association is also indicative of perhaps less acidic situations.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K171, 99S168, 98K114, 99K141

Wieslander: **486, 112**

***Pinus contorta* var. *murrayana* - *Vaccinium uliginosum* Forest**

COMMON NAME	Murray Lodgepole Pine - Bog Blueberry Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pinus contorta* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

Although the alliance is widespread in the upper montane and subalpine zone of most major mountain ranges of the western United States, this association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found along small streams and on the edges of meadows, or on slightly higher elevations in meadows, from approximately 7,500–9,600 feet in elevation on gentle to moderate slopes of variable aspects. Soil textures range from silty loam of granitic origin to muck. Soils are somewhat poorly drained to poorly drained. Litter/Duff cover ranges from 20–95 percent. Sites are palustrine.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Vaccinium uliginosum</i> , <i>Kalmia polifolia</i>
Herbaceous	<i>Carex utriculata</i> , moss

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus contorta* var. *murrayana*
Shrub *Vaccinium uliginosum*
Herbaceous Moss

VEGETATION DESCRIPTION

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The tree layer is composed almost solely of *Pinus contorta* var. *murrayana*, ranging up to 35 meters in height and up to 37 percent cover. *Vaccinium uliginosum* provides from 15–87 percent cover in the shrub layer, which is generally under 0.5 meter. Other (sub)shrubs include *Vaccinium caespitosum* and *Kalmia polifolia*; *Pinus contorta* var. *murrayana* saplings are also present in the shrub layer. The herb layer is variable, with *Carex utriculata* providing most of the cover in this layer; other species include *Mimulus primuloides*, *Juncus drummondii*, and *Oreostemma alpigenum* var. *alpigenum*. Moss covers 5–40 percent of the ground.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3?

RANK JUSTIFICATION At this time only known from Yosemite, however, suspected of being in Sequoia and Kings Canyon national parks and other areas of the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association occurs on the edges of small streams and meadows, where, in some cases, *Pinus contorta* var. *murrayana* seems to be invading. *Vaccinium uliginosum* is somewhat shade tolerant and may also naturally occur in relatively dense and mature understories of *Pinus contorta* var. *murrayana*.

Plots used to describe association (n= 4)

USGS–NPS Veg Data: 99K144, 99K164, 99S123, 99S169

***Pinus contorta* var. *murrayana* / *Carex rossii* Forest**

COMMON NAME	Murray Lodgepole Pine / Ross' Sedge Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural

FORMATION Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pinus contorta* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

While the alliance is widespread in the upper montane and subalpine zone of most major mountain ranges of the western United States, this association has been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory. It is suspected of occurring as far south as Sequoia and Kings Canyon national parks.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of this association is not available without additional inventory.

Yosemite and environs

This association is found on lower to midmountain slope positions from approximately 8,200–10,100 feet in elevation. Slopes are gentle to somewhat steep with variable aspect. Soils are well drained with textures ranging from loamy sand to gravels. They are derived primarily from granite, though sometimes metamorphic, bedrock. Litter/Duff cover ranges from 35–45 percent, and large rock cover may be up to 20 percent.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Carex rossii</i> , <i>Achnatherum occidentale</i> ssp. <i>occidentale</i> , <i>Phlox diffusa</i>

CHARACTERISTIC SPECIES

Globally

Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Carex rossii</i>

VEGETATION DESCRIPTION

Globally

Information about its global characteristics is not available without additional inventory.

Yosemite and environs

An herb layer ranging from less than 10 percent to 25 percent cover characterizes stands of *Pinus contorta* var. *murrayana* - *Carex rossii* Forest. This layer is primarily *Carex* species (assumed by further field inspection to be mostly *C. rossii*). Other species in the herb layer may include *Phlox diffusa* and *Juncus parryi*. There is virtually no shrub layer. The tree layer is composed almost solely of *Pinus contorta* var. *murrayana*, with cover ranging from 35–65 percent cover.

Modal stands are relatively dense woodlands or forests with only scattered sun fleck openings. This is typically a more closed forest than the *P. contorta* var. *murrayana*/*Carex exserta* association.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Currently it is uncertain how common this is in the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Further plot data with full species lists of understory species will be necessary before a full description is available.

Plots used to describe association (n=4)

NRI: 171, 176, 230

Wieslander: 113

***Pinus contorta* var. *murrayana* / *Carex exserta* (*Carex filifolia* var. *erostrata*, Hickman 1993) Forest**

COMMON NAME	Murray Lodgepole Pine - Shorthair Sedge Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminal
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Pinus contorta* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

While the alliance is widespread in the upper montane and subalpine zone of most major mountain ranges of the western United States, this association has been described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory. It is likely that this association occurs as far south as at least Sequoia and Kings Canyon national parks.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of this association is not available without additional inventory.

Yosemite and environs

This association is found on lower to midmountain slope positions from approximately 8,200–10,100 feet in elevation. Slopes are gentle to somewhat steep with variable aspect. Soils are well drained with textures ranging from loamy sand to gravels. They are derived primarily from granite, though sometimes metamorphic, bedrock. Litter/Duff cover ranges from 35–45 percent, and large rock cover may be up to 20 percent. Typical landscape of this association is an open woodland with exposed boulders and granitic benches with intermittent sods of *Carex exserta* occupying the intervening patches of well drained gravelly or sandy soil.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

VEGETATION DESCRIPTION

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus contorta* var. *murrayana* - *Carex exserta* Forest are characterized by an herb layer with 7–60 percent cover at less than 0.5 meter in height. This layer is primarily *Carex exserta* (= *Carex filifolia* var. *erostrata*), which averages 28 percent cover. What negligible shrub layer exists consists primarily of young *Pinus contorta* var. *murrayana*. The tree layer is composed solely of *Pinus contorta* var. *murrayana*, ranging up to 20 meters in height with cover ranging from 1–38 percent and averaging 20 percent. Other herb species that may be present include *Achnatherum occidentale*, *Leptodactylon pungens*, and *Elymus elymoides*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4S4

RANK JUSTIFICATION It is common throughout high central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

We await data from Sequoia and Kings Canyon national parks to further elucidate the relationships with other associations and distribution of this association. Note: This association is typically a woodland or wooded herbland based on criteria on USNVC classification rules. However, it is related to denser stands of *Pinus contorta* var. *murrayana*, which are currently identified as *P. contorta*/*Carex rossii* forest association.

Plots used to describe association (n=7)

USGS–NPS Veg Data: 98K111, 99K118, 99K122, 99S139

NRI: 231

Wieslander: **579, 163**

***Pinus contorta* var. *murrayana* - *Pinus albicaulis* - *Carex rossii* Forest**

COMMON NAME	Murray Lodgepole Pine - Whitebark Pine - Ross' Sedge Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus contorta</i> Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

The alliance is widespread in the upper montane and subalpine zone of most major mountain ranges of the western United States. Information about the global characteristics of this association is not available without additional inventory.

Yosemite and environs

This association is common in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of this association is not available without additional inventory.

Yosemite and environs

This association is found from approximately 9,000–10,600 feet in elevation. Slopes are flat to steep. Aspect is variable but primarily southeast, south, southwest, and west. Soils are moderately well drained to well drained with textures ranging from loam to gravels. They are derived primarily from granitic, though sometimes metamorphic, bedrock. Large rock or bedrock cover may be up to 75 percent. This association often lies at the base of mountain slopes below more open subalpine woodlands and above more mesic woodlands of Sierra Nevada lodgepole pine alliance.

MOST ABUNDANT SPECIES

Globally

Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i> , <i>Pinus albicaulis</i>
Shrub	<i>Pinus contorta</i> var. <i>murrayana</i> , <i>Pinus albicaulis</i>
Herbaceous	<i>Carex rossii</i>

CHARACTERISTIC SPECIES

Globally

Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i> , <i>Pinus albicaulis</i>
Herbaceous	<i>Carex rossii</i>

VEGETATION DESCRIPTION

Globally

Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pinus contorta* var. *murrayana* - *Pinus albicaulis* - *Carex rossii* Forest are characterized by a sparse to dense herb layer less than 0.5 meter. Herbaceous species vary greatly and may include *Arnica cordifolia* and *Juncus parryi*. The shrub layer ranges from 0–62 percent cover, primarily composed of *Pinus contorta* var. *murrayana* or *Pinus albicaulis*. Other species composing the shrub layer may include *Phyllodoce breweri* and *Ribes* species. The tree layer is composed of *Pinus contorta* var. *murrayana* and *Pinus albicaulis*; these are open, multiaged stands with mature trees, saplings, and pole-sized trees. Stands are woodland to forest in structure. *Carex rossii* is relatively shade tolerant and does not require hydric or even substantially mesic conditions. Thus, the understory is open and usually sparse with scattered sprigs of *C. rossii* and other relatively shade tolerant herbs.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4

RANK JUSTIFICATION Likely common in high central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is one of the most common and typical of the lodgepole associations found on lower slopes and edges of drier subalpine meadows throughout the subalpine zone.

Plots used to describe association (n=32)

USGS–NPS Veg Data: 98M94

NRI: 167, 168, 215, 187, 113, 361, 345, 270, 300, 301, 290, 292

Wieslander: 621, 275, 250, 19, 49, 149, 392, 287, 311, 263, 184, 186, 159, 153, 147, 105, 393, 273, 279

***Pinus contorta* var. *murrayana* - *Pinus albicaulis*/*Carex exserta* (*Carex filifolia* var. *erostrata*, Hickman 1993) Forest [Provisional]**

COMMON NAME	Murray Lodgepole Pine - Whitebark Pine - Threadleaf Sedge Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Pinus contorta</i> Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is uncommon in Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association occurs between 10,000–10,500 feet in elevation. Aspects are southeast and southwest, and slopes are gentle to moderate. Soils are derived from granite and are sandy gravels to sand. Sites may be up to 80 percent bedrock.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i> , <i>Pinus albicaulis</i>
Herbaceous	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

CHARACTERISTIC SPECIES

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus contorta</i> var. <i>murrayana</i> , <i>Pinus albicaulis</i>
Herbaceous	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

VEGETATION DESCRIPTION

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, tree cover averages between 5 and 25 percent, and is composed of *Pinus contorta* var. *murrayana* and *Pinus albicaulis*. These two species also make up the shrub layer, which averages 11 percent cover. These species occur in scattered clumps, often as krummholz. Actual shrub species are absent. The herb layer averages 23 percent cover and is composed of variable species, with the exception of *Pinus contorta* var. *murrayana* and *Pinus albicaulis*, which together make up an average 14 percent of this cover. *Carex exserta* (= *Carex filifolia* var. *erostrata*) averages 5 percent cover. Other herb species include *Lupinus lepidus*, *Selaginella watsonii*, and *Phlox diffusa*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION May be uncommon in central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type is tentatively described because of field observations substantiating its existence beyond the two samples taken. Further samples are needed for a better understanding of this type.

Plots used to describe association (n=2)

NRI: 271, 173

***Pinus monticola* – *Pinus contorta* var. *murrayana*/*Achnatherum occidentale* Forest [Provisional]**

COMMON NAME Western White Pine-Lodgepole Pine/Western Needlegrass Forest

SYNONYM None

PHYSIOGNOMIC CLASS Forest

PHYSIOGNOMIC SUBCLASS Evergreen forest

PHYSIOGNOMIC GROUP Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus monticola* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory

Yosemite and environs

This association is the typical *P. monticola* association in Yosemite and environs. It occurs on Buena Vista Crest, the ridge above Siesta Lake, the ridge west of Olmsted Point, Southeast of Cloud's Rest and other locations in the Tuolumne Meadows, Mono Craters and Matterhorn Peak 15 minute quadrangles and the Tamarack Flat, Mount Dana and Tenaya Lake 7.5 minute quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is described only from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association occurs between 7,700–10,160 feet in elevation, primarily on somewhat gentle to moderate slopes (1–15°, mean 7°), often near or partially on the tops of ridges. All aspects are represented, with no particular preference demonstrated. Soils are derived from granite and tend to be shallow to moderate in depth. Textures are sand or sandy loam. Large rock/boulder cover may reach 27 percent of the stand, but bare soil also may reach 75 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory. Similar *P. monticola* dominated woodlands occur further south in the Sierra to at least Tulare County (Keeler-Wolf unpublished data, Mountaineer Creek Research Natural Area)

Yosemite and environs

Tree	<i>Pinus monticola</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Achnatherum occidentale</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus monticola</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Herbaceous	<i>Achnatherum occidentale</i>

VEGETATION DESCRIPTION

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association consists of an open tree canopy dominated by *Pinus monticola*, which averages 20 percent cover. *Pinus contorta* var. *murrayana* is also of regular occurrence averaging about 15 percent in the tree layer. The shrub layer is essentially nonexistent except for young or stunted individuals of *P. monticola* and *P. contorta murrayana* and irregular individuals of *Arctostaphylos nevadensis* and *Chrysolepis sempervirens* (both < 1% cover and 15% frequency or less). The herb layer averages 10 percent cover, with the most frequent species being *Achnatherum occidentale* and *Elymus elymoides*. Other herb species that may be present include *Arabis platysperma*, *Leptodactylon pungens*, *Cistanthe umbellata* var. *umbellata*, *Lupinus lepidus*, *Collinsia torreyi* var. *torreyi* and *Eriogonum incanum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3S3

RANK JUSTIFICATION Probably uncommon throughout its range in the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association is a re-combination of the former *Pinus monticola/Achnatherum occidentale* and *P. monticola-P. contorta* var. *murrayana*. It is now believed that all stands represented by the former two associations are now sufficiently homogeneous to be lumped into a single association.

Plots used to describe association (n=30)

USGS–NPS Veg Data: 99K108, 99K126, 98K53

NRI: 172, 211, 261, 77,110, 178, 209, 210, 330

Wieslander: 89, 90, 217, 226, 230, 267, 269, 326, 371, 372, 391, 529, 575, 603, 671, 764, 768

Potter: 2026

***Tsuga mertensiana* Forest**

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

PHYSIOGNOMIC SUBGROUP

FORMATION

Mountain Hemlock Forest

None

Forest

Evergreen forest

Temperate or subpolar needle-leaved evergreen forest

Natural/Seminatural

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Tsuga mertensiana Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

Stands of *Tsuga mertensiana* Forest are found throughout the Sierra Nevada, however, predominantly north of the Kings River (Potter, 1998).

Yosemite and environs

Stands of *Tsuga mertensiana* Forest are sampled in the mapping area of Yosemite and environs within the Tower Peak 15-minute, Tuolumne Meadows 15-minute, and Tenaya Lake 7.5-minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association is found at mid to high elevations (7,400–9,200 feet) on gentle to somewhat steep (2–29%) slopes. Aspect varies but is often on northeast-facing slopes. Microrelief is usually broken and hummocky. Sites are found at lower to upper portions of slopes and rarely are on ridge tops. Soils are typically from granitic parent material; however, some stands to the north are derived from volcanic or mixed lithology. These soils are typically greater than 25 inches and occasionally greater than 35 inches. Very little bare soil is usually exposed. Soil depths range from 14–40 inches. Soil textures range from sand to loam and are excessively drained to well drained (Potter, 1998).

Yosemite and environs

Stands of *Tsuga mertensiana* Forest are found at midhigh elevations (7,300–9,800 feet) on concave-shaped, moderately steep to somewhat steep slopes (14–20 degrees). These sites are found on lower to upper portions of slopes. Aspect varies from east to northwest; however, it tends to be north facing. The sites are often somewhat stony. Soils are poorly developed to well developed with soil textures ranging from stony gravel to loam from granitic parent material. Fire and disturbance are uncommon in this association, and litter can accumulate to a cover value of 70–88 percent.

MOST ABUNDANT SPECIES

Globally

Tree *Tsuga mertensiana*, *Abies magnifica*, *Pinus contorta* var. *murrayana* (Potter, 1998)

Yosemite and environs

Tree *Tsuga mertensiana*, *Abies magnifica*

CHARACTERISTIC SPECIES

Globally

Tree *Tsuga mertensiana*, *Abies magnifica*, *Pinus contorta* var. *murrayana* (Potter, 1998)

Yosemite and environs

Tree *Tsuga mertensiana*, *Abies magnifica*, *Pinus contorta* var. *murrayana*

VEGETATION DESCRIPTION

Globally

Stands of *Tsuga mertensiana* Forest form a dense forest with an open understory. The tree layer is dominated by *Tsuga mertensiana* mixed with *Abies magnifica*. *Pinus contorta* var. *murrayana* and *Pinus monticola* are also important overstory tree species. The understory layers are typically open. Occasional shrub species may include *Ribes roezlii* (= *Grossularia roezlii*) and *Ribes montigenum*. Herb species may include *Eucephalus breweri* (= *Chrysopsis breweri*), *Hieracium albiflorum*, *Poa bolanderi*, and *Carex rossii*. Conifer regeneration is high at this association and is dominated by *Abies magnifica* with significantly lower amounts of *Tsuga mertensiana* (Potter, 1998).

Yosemite and environs

Stands of *Tsuga mertensiana* Forest form a three-story structure that may have 0–20 percent cover at 35–50 meters tall, 5–70 percent cover at 20–35 meters tall, 0–5 percent cover at 15–20 meters tall, 10 percent cover at 10–15 meters tall, and 0–20 percent cover at 5–10 meters tall. The shrub layer has 5–10 percent cover at 2–5 meters tall, 0–5 percent cover at 1–2 meters tall, 0–5 percent cover at 0.5–1 meter tall, and 0–70 percent cover at 0–0.5 meter tall. The herb layer is often sparse with approximately 5 percent cover at 0–0.5 meter tall. The continuous overstory tree layer is dominated by *Tsuga mertensiana*, although *Abies magnifica* and *Pinus contorta* var. *murrayana* are also important. *Pinus monticola* and *Abies magnifica* are often common in this association. *Pinus albicaulis* is rarely present in some stands. A variety of other species that may be found in the understory herb and shrub layers includes *Carex rossii*, *Antennaria media* (= *Antennaria alpina* var. *media*), *Arabis lyallii*, *Achnatherum pinetorum*, *Eucephalus breweri* (= *Heterotheca breweri*), *Hieracium gracile*, *Juncus parryi*, *Oreostemma alpigenum* var. *alpigenum*, *Ribes montigenum*, *Poa secunda*, and *Poa fendleriana*. *Phyllodoce breweri* can be common at some sites.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Probably relatively widespread in the subalpine of the northern and central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=20)

USGS–NPS Veg Data: 99K117, 98K96, 98K101, 99S110

NRI: 159, 131, 122

Wieslander: 630, 235, 593, 587, 23, 690, 585, 227, 131, 133, 41, 109, 333

***Tsuga mertensiana*- *Pinus monticola* Forest**

COMMON NAME

Mountain Hemlock–Western White Pine Forest

SYNONYM

Mountain Hemlock/Steep (Potter, 1998) in part

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen forest

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen forest

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE

Tsuga mertensiana Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is found throughout the northern regions of the Sierra Nevada, predominantly north of the Kings River, occurring more commonly in the northern portions of this range. Stands are usually less than 10 acres in size (Potter, 1998).

Yosemite and environs

Stands of *Tsuga mertensiana* – *Pinus monticola* Forest are found at upper elevations on both slopes of the range.

ENVIRONMENTAL DESCRIPTION

Globally

Stands of *Tsuga mertensiana* – *Pinus monticola* Forest are found at mid to high elevations (7,120–9,400 feet) on somewhat steep to steep (30–60%) broken and hummocky slopes. Aspects range from northeast to northwest, and snow pack typically lingers into the summer. This association is usually found on the upper portions of slopes just below ridge tops. Soils are moderately deep to deep (22–40+ inches) often greater than 40 inches. Soil texture varies between gravelly sands, gravelly sandy loams, and gravelly loams above sands and sandy loams. Soils are usually excessively drained due to coarse textures. Parent material is granitic or volcanic (including pumice) but rarely metamorphic (Potter, 1998).

Yosemite and environs

Stands of *Tsuga mertensiana*/ *Arabis platysperma* Forest are found at mid to high elevations (8,200–9,900 feet) on moderately steep to somewhat steep, north- and west-facing slopes. Slopes are generally concave in shape. These sites are typically found on the mid to upper portion of slopes with soils that are poorly developed to moderately developed with textures ranging from stony to stony loam. These soils are generally well drained, shallow to deep, and from granitic parent material. Snow accumulation is the highest of any subalpine forest type. This association and many of the high-elevation conifer associations are extremely limited in extent on the east side due to harsh environmental conditions including relatively low precipitation and cold.

MOST ABUNDANT SPECIES

Globally

Tree *Tsuga mertensiana*, *Abies magnifica* (Potter, 1998)

Yosemite and environs

Tree *Pinus monticola*

CHARACTERISTIC SPECIES

Globally

Tree *Tsuga mertensiana*, *Pinus monticola*

Yosemite and environs

Tree *Tsuga mertensiana*, *Pinus monticola*

VEGETATION DESCRIPTION

Globally

Stands of *Tsuga mertensiana*/ *Arabis platysperma* Forest form moderately dense forests dominated by *Tsuga mertensiana*. *Pinus albicaulis* and *Abies magnifica* are also significant. *Pinus contorta* occasionally contributes to minor cover. The shrub layer is essentially nonexistent. The understory herb layer is typically sparse and may include low amounts of *Arabis platysperma*, *Hieracium albiflorum*, *Pedicularis semibarbata*, *Phacelia hydrophylloides*, *Poa bolanderi*, *Poa secunda* (= *Poa gracillima*), and *Carex* sp. (Potter, 1998).

Yosemite and environs

This association consists of mixed-aged, open to dense forest stands dominated by *Tsuga mertensiana*, with an average 44 percent cover, and *Pinus monticola*, with an average 8 percent cover. Sapling *Tsuga mertensiana* is the most frequent species in the otherwise almost nonexistent shrub layer. The herb layer is less than 6 percent cover. The most frequent species in this layer are seedling *Tsuga mertensiana* and *Pinus monticola*. The understory is typically open and may have *Arabis platysperma*, *Poa secunda*, *Arabis lyallii*, *Phyllodoce breweri*, *Ribes montigenum*, *Poa wheeleri*, *Juncus parryi*, and *Carex rossii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: This and *Tsuga mertensiana*/steep association of Potter (1998) Forest have been merged in this discussion. Potter's (1998) description was limited to stands within the distribution of *Abies magnifica* (red fir). However, *Pinus monticola* typically ascends somewhat higher in elevation in the central Sierra Nevada and makes a better constant indicator of the moderately to steeply sloping midslope *Tsuga mertensiana* alliance stands. Thus, we have renamed this association.

Plots used to describe association (n=19)

USGS-NPS Veg Data: 98K106, 99K145, 99K166

NRI Data: 287

Wieslander plots: 108, 387, 615, 364, 658, 567, 225, 265, 331, 654, 650, 652, 760, 547, 549

***Tsuga mertensiana* - *Pinus contorta* var. *murrayana* Forest**

COMMON NAME	Mountain Hemlock Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest
ALLIANCE	<i>Tsuga mertensiana</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Tsuga mertensiana* - *Pinus contorta* Forest are found at upper elevations in the mapping area of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Tsuga mertensiana* - *Pinus contorta* Forest are found at high elevations (8,700–9,900 feet) on the upper portions of gentle to steep slopes (4–45 degrees). Aspect varies but tends to be northerly. Slopes are often concave in shape. These sites are typically found on poorly developed to moderately well developed soils with textures ranging from stony gravel to loams. Soils are usually well drained with depths that are shallow to deep. Parent material is granitic. Fire is uncommon and often restricted in size. This association and many of the high-elevation conifer association are extremely limited in extent on the east side due to harsh environmental conditions including relatively low precipitation and cold.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Tsuga mertensiana*, *Pinus contorta*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Tsuga mertensiana*, *Pinus contorta*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Tsuga mertensiana* - *Pinus contorta* Forest form sparse to moderately dense forests dominated by *Tsuga mertensiana* and *Pinus contorta*, although *Pinus contorta* is less abundant. Other tree species that may be found contributing to minor cover in this association include *Abies magnifica*, *Pinus monticola*, *Pinus jeffreyi*, and *Pinus albicaulis*. The understory layer is often open and may include *Juncus* sp., *Lupinus sellulus* var. *lobbii* (= *Lupinus lepidus* var. *lobbii*), *Lupinus covillei*, *Carex rossii*, *Chrysolepis sempervirens*, and *Antennaria media* (= *Antennaria alpina* var. *media*). *Phyllodoce breweri* may form patches in the small openings along with occasional herbs and grasses including *Cassiope mertensiana*, *Pyrola minor*, *Mitella breweri*, *Calamagrostis stricta* ssp. *inexpansa*, *Luzula parviflora*, *Solidago multiradiata*, *Senecio scorzonella*, and *Trisetum spicatum*. The shrubs *Holodiscus discolor*, *Ribes montigenum*, *Lonicera conjugalialis*, and *Spiraea splendens* (= *Spiraea densiflora*) are occasional. Occasional moist lower slope sites may include additional mesophytic species such as *Carex leporinella*, *Senecio triangularis*, and *Salix lemmonii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION May be fairly common in the northern and central Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: After reanalysis of plot data, the preliminary classification units *T. mertensiana*-*P. contorta*/*Phyllodoce breweri* and *T. mertensiana*-*P. contorta*/*Carex rossii* have been subsumed within this association. Because most of the plots used to define these types are from Wieslander data, which lacks detailed understory species composition, this current association may be thought of as a suballiance category that could possibly be further subdivided with full species plot data.

Plots used to describe association (n=32)

NRI Data: 249, 201, 204, 197

Wieslander: 609, 581, 545, 510, 470, 167, 135, 145, 117, 29, 648, 110, 35, 15, 410, 141, 607, 518, 535, 161, 638, 613, 589, 561, 563, 565, 569, 256

Potter: 1614

***Tsuga mertensiana* - *Pinus contorta* - *Pinus monticola* Forest**

COMMON NAME	Mountain Hemlock - Lodgepole Pine - Western White Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Evergreen forest
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest

ALLIANCE *Tsuga mertensiana*- *Pinus contorta* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory. However, similar stands are likely to occur throughout the northern and central Sierra Nevada subalpine zone.

Yosemite and environs

Stands of *Tsuga mertensiana* - *Pinus contorta* - *Pinus monticola* Forest are found at upper elevations in the mapping area, most likely on both slopes of the range. It was sampled only on the west slope.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Tsuga mertensiana* - *Pinus contorta* - *Pinus monticola* Forest are found at mid to high elevations (8,100–9,600 feet) on flat to steep slopes (0–32 degrees). These slopes are on all aspects; however, they are predominantly found on north-, northwest- and east-facing slopes. Soils are poorly developed to moderately well developed with textures ranging from stony gravel to gravelly loam. These soils are well drained and depth ranges from shallow to deep. Parent material is granitic.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory

Yosemite and environs

Tree *Tsuga mertensiana*, *Pinus contorta*, *Pinus monticola*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Tsuga mertensiana*, *Pinus contorta*, *Pinus monticola*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Tsuga mertensiana* - *Pinus contorta* - *Pinus monticola* Forest are characterized by *Tsuga mertensiana*, *Pinus contorta*, and *Pinus monticola*; however, *Tsuga mertensiana* is most abundant. *Abies magnifica* is occasionally present in the overstory. The understory herb and shrub layers are open and include *Juncus* sp., *Lupinus* sp., *Ribes montigenum*, *Arctostaphylos nevadensis*, *Carex* sp., *Salix* sp., and a variety of other species contributing to minor cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION These mixed stands are likely to be relatively uncommon throughout their range in the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

The Yosemite region may have some of the best developed stands of this association.

Plots used to describe association (n=23)

NRI plots: 208

Wieslander: 7, 2, 734, 744, 577, 234, 240, 728, 730, 757, 759, 762, 591, 583, 395, 139, 233, 242, 82, 96, 4, 619, 537

***Pinus albicaulis* - *Tsuga mertensiana* Woodland**

COMMON NAME	Whitebark Pine - Mountain Hemlock Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus albicaulis* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. It is suspected from the central and northern Sierra Nevada.

Yosemite and environs

This association is commonly found throughout the subalpine regions of the park.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found between 8,900–10,800 feet of elevation. Slopes are moderate to steep, often concave, and aspects are north and east. Stands grow in cool, moist settings in lower to midslope positions. Soils are generally shallow and poorly to moderately well developed with textures that range from stony gravel to stony, gravelly, and sandy loam. Soils are well drained with soil depths ranging from shallow to deep. Parent material is granite. Fire is uncommon and restricted in size. Disturbance levels are usually low at this association.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus albicaulis</i> , <i>Tsuga mertensiana</i>
Shrub	<i>Ribes montigenum</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus albicaulis</i> , <i>Tsuga mertensiana</i>
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VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is codominated by *Pinus albicaulis* and *Tsuga mertensiana*, each providing between 5–30 percent cover. *Ribes montigenum* (1.5% cover) and *Salix drummondiana* (0.75% cover) are common shrub associates. The herbaceous understory is quite diverse with a large variety of forbs and graminoids. Total herbaceous cover averages 20 percent. Common forbs include *Selaginella watsonii* (1% cover), *Antennaria rosea* (0.25% cover), *Phyllodoce breweri*, *Sedum obtusatum*, *Phlox diffusa*, *Penstemon newberryi*, *Cryptogramma acrostichoides*, *Antennaria rosea*, and *Elymus elymoides* ssp. *Californicum*, and/or *Arabis platysperma* (0.25% cover). Graminoids may include *Carex exserta* (*C. filifolia* var. *erostrata*) (10% cover), *Carex rossii*, *Juncus parryi* (1%), and/or *Trisetum spicatum* (0.25% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Probably fairly common and widespread throughout the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=17)

USGS–NPS Veg Data: 99K131, 99S153, 99S98, 99K132

NRI: 358, 170, 206, 250, 303, 304, 356

Wieslander: 611, 3, 626, 39, 406, 512, 85, 87, 106, 137, 624, 634, 143, 281, 378, 571, 632

***Pinus albicaulis*/Carex exserta (Carex filifolia var. erostrata, Hickman 1993) Woodland**

COMMON NAME

Whitebark Pine/Shorthair Sedge Woodland

SYNONYM

None

PHYSIOGNOMIC CLASS

Woodland

PHYSIOGNOMIC SUBCLASS

Evergreen woodland

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE

Pinus albicaulis Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. It is likely to extend south to Sequoia and Kings Canyon national parks.

Yosemite and environs

Stands of this association are found at scattered locations in the alpine regions of the park.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association typically grow on southwest to southeast exposures between 10,200–11,300 feet of elevation. Slopes are moderate to steep. Sites are very stony, often dominated by granitic slabs or boulders, with patches of sandy soil interspersed. Annual precipitation is quite high with the bulk falling as winter snow. Summers are brief and droughty.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus albicaulis</i>
Herbaceous	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus albicaulis</i>
Herbaceous	<i>Carex exserta</i> (= <i>Carex filifolia</i> var. <i>erostrata</i>)

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association have an open canopy of *Pinus albicaulis* (20% cover) with an intermittent herbaceous understory. Often trees form krummholz. Occasional individuals of *Pinus contorta* may be present. The shrub layer is absent or very sparse. Graminoids are the most common plants in the herbaceous layer, most often *Carex exserta* (= *Carex filifolia* var. *erostrata*), which contributes 26 percent cover. In the rockiest stands *Carex exserta* may be absent. Other graminoids present may include *Carex subnigricans* (0.5% cover), *Elymus elymoides* (0.5% cover), and/or *Trisetum spicatum* (0.5% cover). The most common forbs include *Penstemon heterodoxus* (1% cover), *Antennaria corymbosa* (0.5% cover), *Cistanthe umbellata* (0.5% cover), *Gayophytum diffusum* (0.5% cover), *Pyrrocoma apargioides* (0.5% cover), and/or *Silene sargentii* (0.5% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Likely to commonly occur as a subalpine woodland throughout the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=10)

USGS-NPS Veg Data: 98K123, 98M113

NRI: 79, 160, 232, 245, 256, 262, 310

Wieslander: 252

***Pinus albicaulis*/Penstemon davidsonii Woodland [Provisional]**

COMMON NAME	Whitebark Pine/Timberline Beardtongue Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus albicaulis* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. It is suspected to be in Sequoia and Kings Canyon national parks as well.

Yosemite and environs

This association is known from two locations at timberline within the park. The best example is near Mammoth Peak. Stands have been observed on both the east (e.g., Virginia Lakes Basin) and west sides of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association grows on stony sites with patches of sandy soil between boulders. The elevational range is between 10,200–11,400 feet. Aspects are west, and slopes are moderate.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus albicaulis</i>
Herbaceous	<i>Lupinus lepidus</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus albicaulis</i>
Forb	<i>Penstemon davidsonii</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is dominated by stunted *Pinus albicaulis* that provides between 22–43 percent cover. Scattered individuals of *Pinus contorta* may be present. Forbs are scattered and sparse. Common forb associates include *Lupinus lepidus* (3.7% cover), *Eriogonum ovalifolium* (1% cover), *Arenaria kingii* (0.67% cover), *Penstemon davidsonii* (0.5% cover), and/or *Castilleja nana* (0.17% cover). The graminoid species that may be present at low cover values (< 1% cover) include *Poa glauca* ssp. *rupicola* and *Elymus elymoides*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Probably common in the xeric subalpine of the central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=2)

NRI: 309

Wieslander: 373

Pinus albicaulis/*Carex rossii* Woodland [Provisional]

COMMON NAME

Whitebark Pine/Ross' Sedge Woodland

SYNONYM

None

PHYSIOGNOMIC CLASS

Woodland

PHYSIOGNOMIC SUBCLASS

Evergreen woodland

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE

Pinus albicaulis Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Additional plots were sampled within the study area by Taylor (1984) in the Harvey Monroe Hall Research Natural Area. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is only known from a few locations near the Sierra Nevada Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association have been found on sites between 10,000–10,600 feet of elevation on east and west aspects. Slopes are moderate to steep, and stands have been found on a variety of topographic positions. Sites are stony interspersed with patches of coarse soil.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus albicaulis*
Herbaceous *Ivesia santolinoides*, *Carex rossii*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus albicaulis*
Graminoid *Carex rossii*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is characterized by a shrubby (krummholz) layer of *Pinus albicaulis* (mean 15% cover) with occasional emergent individuals of *Pinus contorta*. *Ribes montigenum* and *Artemisia tridentata* may be present in the shrub layer. The herbaceous layer is sparse and not very diverse. Total herbaceous cover averages about 10 percent. *Carex rossii* is the characteristic graminoid, attaining 2 percent cover. Other common graminoid associates include *Juncus drummondii*, *Carex exserta* (*C. filifolia* var. *erostrata*), and/or *Achnatherum occidentale*. Forbs commonly found with this association may include *Ivesia santolinoides*, *Arenaria kingii* ssp. *compacta*, *Lupinus confertus*, and/or *Arabis platysperma*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION May be a relatively uncommon type of the central and southern Sierra Nevada subalpine zone.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association includes the *Pinus albicaulis*/*Poa wheeleri* Woodland of Taylor (1984). Further sampling and analysis will be necessary to confirm this decision. Based on the data available, however, these two seem to be synonymous, with more data supporting *C. rossii* as the understory constant.

Plots used to describe association (n=5)

NRI: 200, 243, 346, 347, 349

Taylor (1984) has additional plots in the study area

***Juniperus occidentalis* var. *australis* Woodland**

COMMON NAME	Sierran Juniper Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Juniperus occidentalis* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found throughout the central and southern regions of the Sierra Nevada, predominantly north of the Kern Plateau. Stands occur in widely separated patches across the landscape many less than 10 acres in size (Potter, 1998).

Yosemite and environs

This association is found in upper montane to subalpine regions of the mapping area, mainly west of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

Elevations typically lie between 7,500-8,500 feet. Sites are typically on southeast and southwest aspects and generally on upper and middle slopes. Slopes are typically steeper than 20 percent. Microrelief is typically undulating to hummocky and broken. This type has significantly more bare ground and surface rock than most other associations (surface rock generally greater than 15 percent).

Yosemite and environs

This association is typically found between 7,200–8,500 feet of elevation. Stands typically grow on southeast and southwest aspects with high solar radiation. Slopes are often steeper than 20 percent, and sites prefer middle and upper slope positions. Stands have a high percentage of bare ground and surface rock, sometimes as much as 50 percent. Stands in the *Juniperus occidentalis* ssp. *australis*/*Arctostaphylos nevadensis* Woodland Phase may be found between 8,300 and 9,800 feet elevation. They occur on west, south and east aspects and on slopes steeper than 35 percent. Shallow soils are rocky and of granitic origin.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Juniperus occidentalis</i> var. <i>australis</i> (Potter 1998)
Shrub	<i>Arctostaphylos nevadensis</i> , <i>Quercus vaccinifolia</i> (Potter 1998)
Herbaceous	<i>Collinsia torreyi</i> (Potter 1998)

Yosemite and environs

Tree	<i>Juniperus occidentalis</i> var. <i>australis</i>
Shrub	<i>Quercus vaccinifolia</i>
Herbaceous	<i>Juncus nevadensis</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Juniperus occidentalis</i> var. <i>australis</i> (Potter 1998)
Shrub	<i>Arctostaphylos nevadensis</i> , <i>Quercus vaccinifolia</i> (Potter 1998)
Herbaceous	<i>Erigeron breweri</i> , <i>Monardella odoratissima</i> (Potter 1998)

Yosemite and environs

Tree	<i>Juniperus occidentalis</i> var. <i>australis</i>
Shrub	<i>Quercus vaccinifolia</i>

VEGETATION DESCRIPTION

Globally

Stands are characteristically open, shrubby woodlands. Tree distribution is often clumped and patchy. Overstories are dominated by *Juniperus occidentalis* var. *australis*, *Pinus contorta* var. *murrayana* and *Pinus jeffreyi*. *Abies magnifica*, *Abies concolor*, and *Pinus monticola* are occasional components in the overstory. Understories are dominated by species that favor dry habitats. *Arctostaphylos nevadensis*, *Quercus vaccinifolia* are usually present. *Ceanothus cordulatus*, *Prunus emarginata*, *Symphoricarpos rotundifolius* are sometimes present. The herbaceous layer contains dry-site species such as *Eriogonum nudum*, *Elymus elymoides*, *Achnatherum occidentale* as well as dry to moderate indicators such as *Monardella odoratissima*, *Gayophytum eriospermum*. Sites typically have high species diversity. These stands are often surrounded by dense forested communities where conditions become more mesic.

Yosemite and environs

This association is an open woodland with clumped and patchy tree distribution and high understory diversity. *Juniperus occidentalis* var. *australis* is the dominant tree, attaining only about 9 percent cover. Common tree associates include *Pinus contorta* (2% cover) and *Pinus jeffreyi* (1.8% cover). *Quercus vaccinifolia* is the dominant shrub, attaining 12 percent cover. *Holodiscus discolor* (0.75% cover), *Leptodactylon pungens* (0.75% cover), and/or *Spiraea splendens* (0.75% cover) are often present. These shrubs are all common dry-site indicators. The herbaceous/graminoid layer is quite diverse though somewhat sparse. The most common species include *Castilleja applegatei* (0.38% cover), *Juncus nevadensis* (0.38% cover), *Sedum obtusatum* (0.38% cover), *Streptanthus tortuosus* (0.38% cover), and/or *Juncus parryi* (0.75% cover). Many other herbaceous species can be present but at very low frequency and cover levels.

Stands in the *Juniperus occidentalis* ssp. *australis*/*Arctostaphylos nevadensis* Woodland Phase are open woodlands with sparse, patchy tree distribution. *Juniperus occidentalis* var. *australis* is the dominant tree with an average cover of 6.7 percent. *Pinus contorta* var. *murrayana* is often present (8.5% cover). *Quercus vaccinifolia* may be the dominant shrub (13% cover), but *Arctostaphylos nevadensis* is a consistent indicator species with 100% frequency. Other shrubs that may be present include *Amelanchier alnifolia*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=41)

USGS–NPS Veg Data: 98M107, 98M86, 98MCHS6, 98MCHS7

NRI: 169, 236, 247, 229, 246, 334, 359, 191, 241, 248

Wieslander: **102, 91, 100, 77, 86, 101, 389, 688, 750, 74, 76, 80, 104, 212, 224, 336, 339, 612, 666, 702, 710, 13, 385, 374,** (*Juniperus occidentalis* ssp. *australis*/*Arctostaphylos nevadensis* Woodland_Phase-Wieslander: **394, 732, 742**)

***Juniperus occidentalis* var. *australis*/Holodiscus discolor Woodland**

COMMON NAME	Sierran Juniper/Hillside Oceanspray Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland
ALLIANCE	<i>Juniperus occidentalis</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found in upper montane to subalpine regions of the mapping area, mainly west of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is typically found between 8,700–9,200 feet of elevation. Stands typically grow on southeast and southwest aspects with high solar radiation. Slopes are very steep, often more than 50 percent. Stands prefer middle and upper slope positions. Stands have a high percentage of bare ground and surface rock, often more than 50 percent.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Juniperus occidentalis* var. *australis*
Shrub *Holodiscus discolor*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Juniperus occidentalis* var. *australis*
Shrub *Holodiscus discolor*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Juniperus occidentalis var. *australis* is the dominant tree species attaining approximately 4 percent cover. *Pinus contorta* (0.8% cover) and *Pinus monticola* (0.4% cover) are common associates. *Holodiscus discolor* is the diagnostic shrub species with 2 percent cover. Other shrubs that occur at lower frequency include *Arctostaphylos nevadensis* (7.6% cover), *Artemisia rothrockii* (6% cover), and *Amelanchier utahensis* (3% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: This is a tentative association and may be best considered a phase of the more widespread *J. occidentalis* var. *australis* association. It is identified as a higher elevation analog of that association at this time.

Plots used to describe association (n=5)

Wieslander: 31, 37, 126, 623, 646

ECOLOGICAL ZONES V AND VI: THE EASTSIDE AND WESTSIDE ALPINE

HERBACEOUS ASSOCIATIONS

Calamagrostis purpurascens - *Leptodactylon pungens* Herbaceous Vegetation

COMMON NAME	Purple Reedgrass - Granite Prickly-Phlox Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland

ALLIANCE *Calamagrostis purpurascens* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. It has also been observed in Kings Canyon National Park.

Yosemite and environs

Known stands of this association are found on Mt. Dana and near Mono, Parker, and Tioga passes.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association grows in a fairly wide variety of xeric alpine habitats. Slopes can be moderate to fairly steep, and aspects are highly variable. Some stands grow in seasonally saturated soils in convex basins, while others are on xeric lower to middle slopes. Soils are stony, well drained, and derived from metamorphic parent material but range in texture from sands to silt loams. Elevations range from 9,500–10,600 feet.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis purpurascens*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Calamagrostis purpurascens*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This highly diverse herbaceous association is characterized by an intermittent canopy of graminoids and forbs with *Calamagrostis purpurascens* (4.6% cover) an important species. *Leptodactylon pungens* (1.25% cover) is diagnostic for this association, and its preferred habitat is well drained stony sites. *Elymus elymoides* (0.75% cover) is a fairly frequent graminoid associate, but at least 13 other graminoids have been recorded in stands at low cover values and frequencies. Traces of cover may be provided by the graminoids *Carex exserta*, *Achnatherum pinetorum*, *Calamagrostis canadensis*, *Carex heteroneura*, *Carex leporinella*, *Carex subnigricans*, *Festuca* spp., and/or *Poa* spp. The most important forbs are *Penstemon davidsonii* (0.38% cover); *Ericameria discoidea* (3.8% cover); *Minuartia nuttallii* (1.25% cover); and traces of *Castilleja nana*, *Eriogonum ovalifolium*, and/or *Potentilla gracilis*. A few scattered emergent shrubs may be present including krummholz *Pinus albicaulis* and/or *Salix planifolia*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

This association or one very similar has been observed near Kearsarge Pass in Kings Canyon National Park.

Yosemite and environs

Plots used to describe association (n=3)

USGS–NPS Veg Data: 98K120, 99S162, 99S163

***Carex breweri* Herbaceous Vegetation**

COMMON NAME

SYNONYM

PHYSIOGNOMIC CLASS

PHYSIOGNOMIC SUBCLASS

PHYSIOGNOMIC GROUP

Brewer's Sedge Herbaceous Vegetation

Brewer Sedge Association (Taylor, 1984)

Herbaceous vegetation

Perennial graminoid vegetation

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP
FORMATION

Natural/Seminatural
Short alpine or subalpine sod grassland

ALLIANCE

Carex breweri Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. The species ranges north through the Klamath Mountains of northwestern California to the high mountains of Oregon and Washington (NRCS Plants database 2001).

Yosemite and environs

Stands of this association have been sampled at various meadows near the Tioga and Parker passes and at Hall RNA.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine grassland prefers moderate to steep slopes on northern to western aspects. Elevations range from 10,200–11,200 feet. Stands grow on middle to upper slopes in concave snowbeds with late snowmelt. The soils are stony, sandy loams and well drained. Sites are seasonally saturated by the snowmelt, but summers are dry. These stands must endure several months of drought.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex breweri*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex breweri*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association forms a patchy sward of graminoids and forbs heavily dominated by *Carex breweri* (31% cover). *Juncus parryi* (1.5% cover) is also important. Other graminoids that may provide a trace of cover include *Trisetum spicatum*, *Poa fendleriana*, *Poa stebbinsii*, *Carex subnigricans*, *Carex vernacula*, and/or *Calamagrostis breweri*. *Antennaria media* (4.5% cover) and *Lupinus lepidus* (1% cover) are the most constant forbs. Other common forb associates providing traces of cover may include *Arabis platysperma*, *Silene sargentii*, and/or *Selaginella watsonii*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably limited to the high central and southern Sierra Nevada.

DATABASE CODE To be determined

COMMENTS
Globally

Yosemite and environs

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99K156, 99K160, 99S155, 99K15

***Carex helleri* - *Eriogonum incanum* - *Raillardella argentea* Herbaceous Vegetation**

COMMON NAME	Heller's Sedge - Frosted Wild Buckwheat - Silky Raillardella Herbaceous Vegetation
SYNONYM	<i>Eriogonum incanum</i> - <i>Raillardella argentea</i> Herbaceous Vegetation
PHYSIOGNOMIC CLASS	Herbaceous vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland
 ALLIANCE	 Carex helleri Herbaceous Alliance
 CLASSIFICATION CONFIDENCE LEVEL	 3
 USFWS WETLAND SYSTEM	 Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. *Carex helleri* has its center of distribution in the high mountains of California (including Mt. Shasta and the High Sierra Nevada). It ranges north to Oregon and east to Nevada.

Yosemite and environs

This association is found in scattered alpine locations east and west of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine herbaceous/grassland association grows in snow patches that often persist until late July. Elevation averages about 10,500 feet. Slopes are gentle to moderately steep, and aspects are north to east. Stands are found on upper slopes and ridges with rapidly drained gravely loams or sandy loams derived from metamorphic parent material.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Raillardella argentea*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Raillardella argentea*, *Eriogonum incanum*, *Carex (helleri, breweri, stramineiformis, subnigricans)*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine grassland forms an open canopy of forbs and graminoids less than 0.5 meter in height. Total cover is less than 50 percent. *Raillardella argentea* and *Eriogonum incanum* are the diagnostic forbs with each attaining about 9 percent cover, though *Arenaria kingii* may be dominant in some stands (18% cover). Other forbs that provide traces of cover may include *Arabis platysperma*, *Castilleja nana*, *Cistanthe monosperma*, *Draba densifolia*, *Lupinus confertus*, *Penstemon heterodoxus*, and/or *Silene sargentii*. Perennial graminoids only provide a small portion of total cover with most species averaging about 1 percent cover. Diagnostic graminoid species include *Carex helleri*, *Carex breweri*, *Carex stramineiformis*, and/or *Carex subnigricans*. Other graminoid associates may include *Trisetum spicatum*, *Achnatherum occidentale*, *Elymus elymoides*, and/or *Agoseris glauca*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to occur only in the High Sierra Nevada in small scattered stands.

DATABASE CODE To be determined

COMMENTS

Globally

This association has been provisionally placed within the USNVC hierarchy. The *Carex helleri* Alliance does not currently exist.

Yosemite and environs

Note: This association was originally called the *Eriogonum incanum* - *Raillardella argentea* association by Taylor (1984). It has been renamed to distinguish its alignment with *Carex helleri*, although *Carex helleri* is not usually dominant in the stands.

Plots used to describe association (n=1)

USGS–NPS Veg Data: 99S151

***Carex helleri* - *Saxifraga tolmiei* - *Luzula divaricata* Herbaceous Vegetation**

COMMON NAME	Heller's Sedge - Tolmie's Alpine Saxifrage - Spreading Woodrush Herbaceous Vegetation
SYNONYM	<i>Saxifraga tolmiei</i> - <i>Luzula divaricata</i> Association
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine sod grassland
ALLIANCE	Carex helleri Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. *Carex helleri* has its center of distribution in the high mountains of California (including Mt. Shasta and the High Sierra). It ranges north to Oregon and east to Nevada.

Yosemite and environs

This association is found in scattered alpine locations near the Sierra Nevada Crest. Stands have been observed in the Hall RNA (Taylor, 1984) and in the upper Virginia Lakes Basin.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine herbaceous/grassland association grows in sheltered cold concavities that retain snowpatches, often persisting until late July. Elevations average about 10,200 feet. Stands are found on moderately steep to steep midslopes, and aspects are north to east. Soils are rapidly drained sands derived from granitic and metamorphic parent materials. Much of the substrate is broken talus or bedrock.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Saxifraga tolmiei*, *Carex helleri*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Saxifraga tolmiei*, *Luzula divaricata*, *Carex helleri*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparse herbaceous/grassland association forms an open canopy less than 0.5 meter in height. Total vegetative cover is less than 20 percent. Stands are codominated by the graminoid *Carex helleri* (2.5% cover) and the forb *Saxifraga tolmiei* (2.5% cover). *Luzula divaricata* is also diagnostic but has lower constancy than the dominant species. This vegetation is not very diverse; only nine species were recorded from a plot. Other graminoids recorded at trace amounts include *Carex breweri* and/or *Trisetum spicatum*. Forbs present in trace amounts may include *Arabis lyallii*, *Arabis platysperma*, *Lupinus lepidus*, and/or *Silene sargentii*. Traces of emergent krummholz *Pinus albicaulis* may be present.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably restricted to the High Sierra in small scattered patches.

DATABASE CODE To be determined

COMMENTS

Globally

This association has been provisionally placed within the USNVC hierarchy. The *Carex helleri* Alliance does not currently exist.

Yosemite and environs

Plots used to describe association (n=1)

USGS-NPS Veg Data: 99K157

Taylor (1984): has additional plots from the eastside of the study area

***Carex spectabilis* - *Sibbaldia procumbens* Herbaceous Vegetation**

COMMON NAME

Showy Sedge - Creeping Glow-Wort Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Short alpine or subalpine sod grassland

ALLIANCE

Carex spectabilis Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. Both nominal species range widely in alpine and boreal North America.

Yosemite and environs

This association has been described from scattered alpine locations east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine herbaceous vegetation grows at about 10,500 feet of elevation on moderate to steep slopes near seeps. Aspects are generally south, and substrates are seasonally saturated silt loams derived from granitic or metamorphic parent materials. This is a well drained community that occurs on stony and/or bouldery slopes often in small patches at the base of outcrops.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex spectabilis*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Carex spectabilis*, *Sibbaldia procumbens*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This alpine grassland is heavily dominated by *Carex spectabilis*, which attains 34 percent cover. No other graminoid or forb species achieves more than 1 percent cover, though 55 species have been recorded on plots of this type. Graminoids with high constancy include *Poa secunda*; *Calamagrostis breweri*; *Trisetum spicatum*; and various *Poa*, *Juncus*, and *Elymus* species. The forb *Sibbaldia procumbens* is diagnostic but attains only 0.3 percent cover and 70 percent constancy. Similar cover and constancy values are attained by the forbs *Penstemon heterodoxus*, *Polygonum bistortoides*, *Rumex paucifolius*, and *Potentilla* spp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably widespread in the High Sierra Nevada but restricted to many small stands.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=2)

USGS–NPS Veg Data: 98K110, 98K121, 99S124

Taylor (1984): has additional plots from the eastside of the study area

***Juncus parryi* - *Eriogonum incanum* Herbaceous Vegetation**

COMMON NAME	Parry's Rush - Frosted Wild Buckwheat Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Short alpine or subalpine dry bunch grassland

ALLIANCE *Juncus parryi* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. This alliance includes an alpine snowbed community that was described from the Stony Mountains of southwestern Montana.

Yosemite and environs

Stands of this association are found at scattered locations in the alpine zone.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory. The stands described in Montana have elevations ranging from 9,500–10,000 feet. Stands were common near the base of gentle alpine slopes where deep snow accumulates in the winter. Sites are flat to gently sloping, often with southern aspects on the lee side of knolls or ridges away from the prevailing southwest and west wind. The growing season is short because the deep snow cover often lasts to midsummer resulting in cold, wet soils. Soils are shallow, poorly developed clays with the soil surface having high cover of gravel and bare ground (50%).

Yosemite and environs

This grassland occurs between 10,000–11,500 feet of elevation on moderate to steep slopes on variable aspects. Soils are well drained sandy loams or silt loams derived from metamorphic parent material. Sites are very stony, averaging 60 percent rock.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Juncus parryi*, *Eriogonum incanum*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Juncus parryi*, *Eriogonum incanum*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory. In the stands described in Montana, vegetation in this alliance has a moderately dense herbaceous layer codominated by the perennial graminoid *Juncus parryi* and the perennial forb *Erigeron ursinus*. Common associates include the perennial grasses *Festuca idahoensis* and *Poa glauca* and the forbs *Erigeron peregrinus*, *Erigeron simplex*, *Antennaria umbrinella*, and *Lewisia pygmaea*. There is also sparse moss and lichen cover. Adjacent vegetation is typically grasslands dominated by *Festuca idahoensis* and *Potentilla diversifolia*.

Yosemite and environs

This grassland is dominated by *Juncus parryi*, which attains 16 percent cover. Total vegetative cover for this association averages only 35 percent. The forb *Eriogonum incanum* (5.6% cover) and the graminoid *Carex exserta* (3% cover) are the only other plants attaining more than a trace of cover. *Poa secunda* (0.7% cover) is a fairly constant graminoid associate. Forbs often associated with this type include *Penstemon heterodoxus*, *Antennaria media*, and/or *Raillardella argentea*. As many as 40 other species may occur at very low cover and constancy values.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be fairly widely distributed throughout the High Sierra Nevada but in small stands.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=7)

USGS-NPS Veg Data: 99K175, 98M122, 98K89, 98M127, 99K154, 99S150

NRI: 308

Taylor (1984): has additional plots from the east side of the study area

***Juncus parryi* - *Phyllodoce breweri* Herbaceous Vegetation**

COMMON NAME

Parry's Rush - Red Mountain-Heath Herbaceous Vegetation

SYNONYM

***Phyllodoce breweri* Association (Taylor, 1984)**

PHYSIOGNOMIC CLASS

Herbaceous Vegetation

PHYSIOGNOMIC SUBCLASS

Perennial graminoid vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar grassland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION Short alpine or subalpine dry bunch grassland

ALLIANCE *Juncus parryi* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. This alliance includes an alpine snowbed community that was described from the Stony Mountains of southwestern Montana.

Yosemite and environs

This association has been documented from the Virginia Lakes Basin of the study area.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this alpine shrub/grassland association are found at about 10,200 feet of elevation on moderate to steep midslopes. Aspects are east, and soils are well drained silt loams derived from metamorphic parent material. Sites are fairly stony and tend to accumulate deep snowpacks that persist until about late July.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Phyllodoce breweri</i>
Herbaceous	<i>Carex exserta</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Phyllodoce breweri</i>
Herbaceous	<i>Juncus parryi</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Based on limited quantitative data for this description, this association is characterized by an open canopy of *Phyllodoce breweri* (37% cover) over a graminoid/forb subcanopy. Canopy height is less than 0.5 meter. Scattered emergent individuals of *Pinus albicaulis* may be present. *Carex exserta* (15% cover) is the dominant graminoid, but *Juncus parryi* (2.5% cover) is diagnostic. Traces of other graminoids may be present including *Achnatherum nevadense*, *Elymus*

elymoides, and/or *Poa secunda*. Forbs are scattered and sparse with *Antennaria rosea* attaining the most cover at 2.5 percent. Traces of the forbs *Arabis platysperma*, *Monardella odoratissima*, and/or *Penstemon heterodoxus* may be present.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be fairly widely distributed throughout the High Sierra Nevada but in small stands.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

More stands of this vegetation need to be sampled. Some stands observed, but not sampled, contain more even cover of both *Phyllodoce breweri* and *Juncus parryi*. At this point *Phyllodoce breweri* does not appear to be ecologically distinctive enough to deserve a separate alliance.

Plots used to describe association (n=1)

USGS–NPS Veg Data: 98M95

Taylor (1984): has additional plots from the east side of the study area

***Hulsea algida* - *Ericameria discoidea* - *Phacelia hastata* var. *compacta* Herbaceous Vegetation [Provisional]**

COMMON NAME	Pacific Alpinegold - California Heath-Goldenrod – Silverleaf Scorpion-Weed Herbaceous Vegetation
SYNONYM	<i>Macronema discoideum</i> – <i>Phacelia frigida</i> Association (Taylor, 1984)
PHYSIOGNOMIC CLASS	Herbaceous Vegetation
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Low temperate or subpolar perennial forb vegetation
ALLIANCE	<i>Hulsea algida</i> Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. It is probably limited to the High Sierra Nevada.

Yosemite and environs

This association has been documented from stands in the Hall RNA and near Dana Peak. It has been observed in the upper Virginia Lakes Basin east of the crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this alpine forb association occur in stony environments like talus slopes and fell fields. Sites are relatively xeric uplands. Elevations average about 10,500 feet, and slopes are moderate and face south and west. Soils are well drained sandy loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Subshrub	<i>Eriogonum ovalifolium</i>
Herbaceous	<i>Muhlenbergia richardsonis</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Subshrub	<i>Ericameria discoidea</i>
Herbaceous	<i>Hulsea algida</i> , <i>Phacelia hastata</i> var. <i>compacta</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This perennial forb vegetation is characterized by several cold- and drought-tolerant forbs and subshrubs, primarily *Hulsea algida*, *Phacelia hastata* var. *compacta*, and *Ericameria discoidea*. Total vegetative cover is generally less than 50 percent. *Eriogonum ovalifolium* (15% cover) is the most common subshrub in some stands, with *Muhlenbergia richardsonis* (15% cover) the most common graminoid. Other graminoids present may include *Achnatherum occidentale*, *Elymus elymoides*, *Carex exserta* (*C. filifolia* var. *erostrata*), and/or *Poa wheeleri*. The forbs present in trace amounts may include *Achillea millefolium*, *Minuartia nuttallii*, *Penstemon rydbergii*, and/or *Potentilla glandulosa*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Relatively restricted to high talus or scree above timberline in the High Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type occurs on both east and west sides of the crest on granitics and metamorphics.

Plots used to describe association (n=1)

USGS–NPS Veg Data: 99S154

Taylor (1984): has additional plots from the east side of the study area

***Phlox covillei* - (*Phlox condensata*) - *Elymus elymoides* - *Podistera nevadensis* Herbaceous Vegetation**

COMMON NAME	Coville's Phlox – Western Bottle-Brush Grass –Podistera Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Low temperate or subpolar perennial forb vegetation
ALLIANCE	<i>Phlox covillei</i> Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found at scattered locations along the Sierra Nevada crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this alpine association occur on talus slopes and ridgelines at about 11,100 feet of elevation. Slopes are moderate to steep. Aspects are south and west, and sites are probably free of snow early in the season followed by a long, droughty summer. Soils are well drained sands with significant talus or cobble.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Phlox covillei* (*condensata*)

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Phlox covillei*, *Podistera nevadensis*, *Elymus elymoides* ssp. *californicus*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparse alpine herbaceous vegetation is characterized by a low (< 0.5 meter) open canopy of forbs and graminoids. Thirty-eight species have been recorded in plots of this type. *Phlox covillei* is the dominant forb with 2.5 percent cover. *Arenaria kingii* ssp. *compacta* (0.5% cover) is also usually present. *Podistera nevadensis* is a diagnostic forb, achieving 1.8 percent cover and occurring in 75 percent of stands. *Elymus elymoides* ssp. *californicus* (0.8% cover) is also a constant and the most common graminoid. Other common forb associates may include *Eriogonum ovalifolium* (1.3% cover), *Eriogonum rosense* (0.8% cover), *Castilleja nana* (0.4% cover), *Draba densifolia* (0.4% cover), *Ericameria parryi* var. *monocephala* (4.4% cover), *Astragalus whitneyi* var. *whitneyi* (0.75% cover), *Astragalus purshii* var. *lectulus* (0.25% cover), *Erigeron compositus* (0.25% cover), and/or *Erigeron pygmaeus* (0.25% cover). Graminoids present commonly include *Poa glauca* ssp. *rupicola* (0.4% cover), *Achnatherum pinetorum* (0.25% cover), *Carex tahoensis* (0.25% cover), and/or *Festuca brachyphylla* ssp. *brachyphylla* (0.25% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to be limited to the High Sierra Nevada in small stands.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: *Phlox covillei* has been synonymized by some authors with *Phlox condensata* (including Jepson manual), a species considered to be largely of the eastside pine and pinyon woodland belt in California. The predominant species in this association is probably *Phlox covillei*, however at lower elevations in the subalpine the similar *Plox diffusa* may be present.

Plots used to describe association (n=4)

USGS-NPS Veg Data: 98K118, 98M119, 98M120, 98M121

***Phlox covillei*-*Elymus elymoides* - *Podistera nevadensis* - *Erigeron pygmaeus* Herbaceous Vegetation**

COMMON NAME	Sierran Woodroot - bottlebrush Squirreltail - Pygmy Fleabane Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous vegetation
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural

FORMATION Low temperate or subpolar perennial forb vegetation

ALLIANCE Phlox Covillei- Elymus elymoides Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found at scattered locations along the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this alpine association occur on talus slopes and ridgelines at between 11,500–12,500 feet of elevation. Slopes are moderate to steep. Aspects are south and west, and sites are probably free of snow early in the season followed by a long, droughty summer. Soils are well drained and gravelly with significant talus, scree, or cobble.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Festuca brachyphylla* ssp. *brachyphylla*, *Podistera nevadensis*, *Phlox pulvinata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Elymus elymoides* ssp. *californicus*, *Podistera nevadensis*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparse alpine herbaceous vegetation is characterized by a low (< 0.5 meter) open canopy of forbs and graminoids. *Podistera nevadensis* is a diagnostic forb, achieving 0.4 percent cover and occurring in 75 percent of stands. *Elymus elymoides* ssp. *californicus* (0.1% cover) is also diagnostic and one of the most common graminoids. Other common forb associates may include *Phlox pulvinata* (0.4% cover), *Eriogonum ovalifolium* (0.2% cover), *Selaginella watsonii* (0.2% cover), *Draba densifolia* (0.07% cover), *Astragalus kentrophyta* (0.1% cover), and/or *Erigeron pygmaeus* (0.13% cover). Graminoids present commonly include *Festuca brachyphylla* ssp. *brachyphylla* (0.06% cover) and/or *Poa glauca* ssp. *rupicola* (0.06% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: *Phlox covillei* has been synonymized by some authors with *Phlox condensata*, a species considered to be largely of the eastside pine and pinyon woodland belt in California.

Plots used to describe association (n=8)

NRI: 217, 255, 294, 295, 297, 313, 306, 307

***Sedum integrifolium*- *Selaginella watsonii* Herbaceous Vegetation**

COMMON NAME

Alpine Sedum - Watson's Spikemoss Herbaceous Vegetation

SYNONYM

Alpine Sedum – Watson Spikemoss Association (Taylor, 1984)

PHYSIOGNOMIC CLASS

Herbaceous vegetation

PHYSIOGNOMIC SUBCLASS

Perennial forb vegetation

PHYSIOGNOMIC GROUP

Temperate or subpolar perennial forb vegetation

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Low temperate or subpolar perennial forb vegetation

ALLIANCE

To be determined

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Only one stand of this association is known within the park, near Tioga Pass.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The site for this association is at 11,000 feet of elevation on a moderate, north-facing slope. The site is a stony toeslope, and the soil is moderately well drained loam.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Antennaria media*, *Potentilla drummondii*, *Rhodiola rosea*, *Carex exserta*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Sedum obtusatum*, *Selaginella watsonii*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This sparse alpine herbaceous association is dominated by *Antennaria media*, *Potentilla drummondii*, and *Rhodiola rosea* (= *Sedum integrifolium*), each with 15 percent cover. The diagnostic forbs *Sedum integrifolium* and *Selaginella watsonii* each attain 2.5 percent cover. Other common forb associates may include *Penstemon rydbergii* var. *oreocharis* (2.5% cover), and traces of *Arenaria kingii*, *Castilleja nana*, *Cistanthe umbellata*, *Eriogonum ovalifolium*, and/or *Lupinus sellulus* ssp. *sellulus*. The graminoid cover is low, totaling only about 5 percent. Graminoid associates may include *Carex exserta* (2.5% cover) *Carex specifica* (0.5% cover), *Festuca saximontana* (0.5% cover), *Juncus parryi* (0.5% cover), and/or *Poa secunda* (0.5% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

The place of this association within the USNVC needs to be determined.

Yosemite and environs

This is currently a poorly defined type requiring further plot data and analysis to substantiate.

Plots used to describe association (n=1)

USGS–NPS Veg Data: 98M112

Taylor (1984): has additional plot data from the study area

***Pentaphylloides floribunda*/Danthonia intermedia Herbaceous Vegetation [Provisional]**

COMMON NAME

Shrubby cinquefoil/intermediate oat grass Herbaceous Vegetation

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS Deciduous shrubland
PHYSIOGNOMIC GROUP Cold-deciduous shrubland
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Medium-tall temperate or subpolar grassland with a sparse cold-deciduous shrub layer

ALLIANCE Pentaphylloides Floribunda Shrub Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pentaphylloides floribunda*/*Danthonia intermedia* Herbaceous Vegetation are sampled in the mapping area of Yosemite and environs within the Dunderberg Peak and Koip Peak 7.5 minute topographic quadrangles.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pentaphylloides floribunda* /*Danthonia intermedia* Herbaceous Vegetation are found at mesic sites at high elevation (9,850–11,120 feet) on low, mid to upper portions of generally linear to undulating, moderate to steep (>10 degrees) slopes. Exposures are variable ranging from north to east to south. These sites are usually found on ridges and bedrock outcrops. Soils tend to be poorly developed, rapidly to well-drained loam (loamy sand to silt loam) from metamorphic parent materials. The amount of bedrock ranges from 20-30%, other rock cover adds an additional 30-40% cover, with leaf litter contributing 20-30% cover. Wood is scarce on these sites, and bare soil exposure may be up to 20 percent.

MOST ABUNDANT SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Pentaphylloides floribunda*
Herbaceous *Poa glauca*, *Carex exserta*, *Selaginella watsonii*

CHARACTERISTIC SPECIES

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Pentaphylloides floribunda*
Herbaceous *Danthonia intermedia*

VEGETATION DESCRIPTION

Globally

This association has been described only from Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of *Pentaphylloides floribunda* /*Danthonia intermedia* Herbaceous Vegetation form an open shrub layer with a mixed herbaceous dicot and grass understory. *Pentaphylloides floribunda* dominates stands in stature with 22% mean cover. *Danthonia intermedia* provides little cover (1.8%) but is a consistent component. Other important species include *Poa glauca* (15%), *Carex exserta* (15%), and *Selaginella watsonii* (8.7%). Other species with high frequency but low cover include *Elymus elymoides*, *Muhlenbergia richardsonis* and *Trisetum spicatum*. Other species that may occasionally be found in the stands include *Pyrrocoma apargioides*, *Elymus trachycaulus*, *Antennaria rosea* and *Sedum rosea*. *Gentianella tenella* ssp. *tenella*. is a rare species that may be found in this association.

OTHER NOTEWORTHY SPECIES

Gentianella tenella ssp. *tenella* is a Park Sensitive (Special Status Vascular Plant Species List for YNP-2003) species found in one of the three plots. This is a circumpolar species that occurs in the central and southern Sierra Nevada (Tuolumne and Tulare counties), the White and Inyo mountains (Mono and Inyo counties) and north (Siskiyou County). It is usually found in open, wet areas between 3,200 – 3,900 m in subalpine forests or alpine fell-fields. It is documented from only two locations in Yosemite National Park.

CONSERVATION RANK G4?

RANK JUSTIFICATION Probably of somewhat limited distribution at high elevations in the Sierra Nevada and Cascade Mountains and possibly in the White Mountains and the Klamath Range.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=3)

USGS–NPS Veg Data: 98K124, 99K133, 99K152

(SUB)SHRUB/SCRUB ASSOCIATIONS OF ZONES V AND VI

***Artemisia rothrockii*/Monardella odoratissima Dwarf-shrubland**

COMMON NAME	Rothrock's Sagebrush/Alpine Mountainbalm Dwarf-Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Dwarf-shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic evergreen dwarf-shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Extremely xeromorphic evergreen subdesert dwarf-shrubland

ALLIANCE *Artemisia rothrockii* Dwarf-shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. Anecdotal information suggests that this association or at least the alliance may range from the northern to the southern High Sierra (Sawyer and Keeler-Wolf 1995).

Yosemite and environs

Stands of this association are found near seeps and streams east of the Sierra Crest within the project environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this vegetation are found between 8,700–10,200 feet of elevation on varied slopes and aspects but largely southerly facing. Stands are near seeps or streams with perennial moisture. Soils are gravelly silt loams to loamy sands and often carbonate-rich.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia rothrockii*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia rothrockii*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This dwarf-shrubland is heavily dominated by *Artemisia rothrockii* with 45 percent–66 percent cover. The only shrubs that co-occur in this association are *Symphoricarpos rotundifolius*, with only 33 percent constancy and 1 percent cover, and both *Ribes montigenum* and *Holodiscus discolor* each at 17 percent constancy and less than 1 percent cover. On a single plot a *Salix* sp. covered about 20 percent. Graminoids dominate the open herbaceous layer, and species composition may be highly variable between stands. *Carex exserta* (*C. filifolia* var. *erostrata*) (13% cover), *Danthonia intermedia* (0.3% cover), and/or *Poa wheeleri* (5% cover) are the most common graminoid associates. Forbs only total a small amount of cover in this association, typified by the diagnostic forb *Monardella odoratissima* (0.8% cover). Other forbs that are often present at very low cover values may include *Antennaria rosea*, *Penstemon rydbergii*, *Juncus* sp., and/or *Horkelia fusca*. Twenty-five other species have been recorded on plots of this association, but none achieve more than 30 percent constancy. The forb *Castilleja miniata* and the graminoid *Poa wheeleri* each achieve 5 percent cover in 30 percent of plots. All other recorded species (mostly graminoids) only contribute a trace to the overall cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably endemic to the central and southern High Sierra Nevada and perhaps the high Transverse Ranges of California.

DATABASE CODE To be determined

COMMENTS

Globally

Artemisia rothrockii is endemic to California.

Yosemite and environs

This association is currently placed in the wrong portion in the USNVC hierarchy. It should be placed with microphyllous dwarf-shrubland vegetation, as it is not extremely xeromorphic.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99S126, 99S128, 98M74

Salix arctica - *Calamagrostis breweri* - *Vaccinium caespitosum* - *Antennaria media* Dwarf-Shrubland

COMMON NAME

Arctic Willow - Shorthair Reedgrass - Dwarf Blueberry - Stony
Mountain Pussytoes Dwarf-Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Dwarf-shrubland

PHYSIOGNOMIC SUBCLASS

Deciduous dwarf-shrubland

PHYSIOGNOMIC GROUP Cold deciduous dwarf-shrubland
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Creeping or matted cold deciduous dwarf-shrubland

ALLIANCE *Salix arctica* Dwarf-shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association grows near lakes and streams in alpine regions east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found near seeps, streams, or lakes between 10,000–11,200 feet of elevation. Soils are seasonally saturated silt loams and clay loams derived from igneous and metamorphic parent materials. Slopes are gentle to moderate, and stands prefer basins as well as lower and sometimes middle slope positions. Aspects are generally north and east.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix arctica*
Herbaceous *Calamagrostis breweri*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Salix arctica*
Herbaceous *Antennaria media*, *Calamagrostis breweri*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation forms a low, intermittent canopy less than 0.5 meter in height. Graminoids tend to be emergent over the low, mat-forming dominant shrub species *Salix arctica* (26% cover). *Vaccinium caespitosum* (9.5% cover) and *Kalmia*

polifolia (7.5% cover) complete the subshrub "canopy." Forbs provide a little cover, primarily *Antennaria media* (3.2% cover), *Castilleja lemmonii* (0.4% cover), *Oreostemma alpigenum* var. *alpigenum* (2.1% cover), *Luzula congesta* (0.5% cover), *Potentilla drummondii* (0.9% cover), and/or *Gentiana newberryi* (0.2% cover). Many graminoid species are present, mostly *Carex* and *Juncus* species. The most common graminoids are *Trisetum spicatum* (0.8% cover), the diagnostic graminoid *Calamagrostis breweri* (8% cover), and/or *Juncus parryi* (0.2% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Probably widespread in the Sierra Nevada alpine but of limited extent.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

These stands are ecologically closely related to some stands of *Calamagrostis breweri* and *Vaccinium caespitosum* alliances. Further analysis will probably suggest a moist/wet alpine turf ecological group that will include these and other associations from other alliances.

Plots used to describe association (n=9)

USGS–NPS Veg Data: 98K91, 98M114, 98M129, 98M92, 99K155, 99S140, 99S156, 99S160, 98M130

ECOLOGICAL ZONES VII AND VIII: THE EASTSIDE FORESTS, WOODLANDS, AND SCRUBS

HERBACEOUS VEGETATION

Juncus balticus - *Juncus mexicanus* Herbaceous Vegetation

COMMON NAME	Baltic Rush - Mexican Rush Herbaceous Vegetation
SYNONYM	None
PHYSIOGNOMIC CLASS	Herbaceous vegetation
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
PHYSIOGNOMIC FORMATION	Seasonally flooded temperate or subpolar grassland
ALLIANCE	<i>Juncus balticus</i> Seasonally Flooded Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association has been documented from scattered locations throughout the park and environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association have been found from 4,200–9,500 feet of elevation in seasonally flooded valley bottoms and meadows. Slopes are flat to very gentle, and stands can occur on all aspects. Soils are moderately to poorly drained loams, loamy sand, or clay loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Juncus balticus*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Herbaceous *Juncus balticus*, *Juncus mexicanus*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This seasonally flooded perennial grassland is dominated by *Juncus balticus* (34% cover), with *Juncus orthophyllus* (17% cover) and *Juncus mexicanus* (10% cover) important species. *Poa pratensis* (6% cover) is also usually present. Forbs are sparse but fairly diverse. *Achillea millefolium* (0.5% cover), *Iris missouriensis* (1% cover), and/or *Taraxacum officinale* (1% cover, exotic) have the highest frequency, though *Mimulus primuloides* (12.5% cover) may be abundant in some stands. Total vegetative cover for this association often exceeds 80 percent, and the canopy is usually less than 0.5 meter in height.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

A grazing-tolerant vegetation, this association is resistant to repeated heavy grazing along eastside creeks and meadows.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 98K55, 98K57, 98M28, 98M57, 99K78, 98M87

SHRUB/SCRUB ASSOCIATIONS OF ECOLOGICAL ZONES VII AND VIII

***Ceanothus velutinus* - *Prunus emarginata* - *Artemisia tridentata* Shrubland [Provisional]**

COMMON NAME	Tobacco-Brush - Bitter Cherry - Big Sagebrush Shrubland
SYNONYM	Tobacco Brush Series (in part)
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Temperate broad-leaved evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural /Seminatural
FORMATION	Sclerophyllous temperate broad-leaved evergreen shrubland

ALLIANCE *Ceanothus velutinus* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. The alliance is widespread in western North America.

Yosemite and environs

Stands of this association are found in the montane regions of the park east of the Sierra Nevada crest including Lundy Canyon, Lee Vining Canyon, and Virginia Lakes Basin.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The seven known stands of this association are found from 7,200–8,600 feet elevation. Stands are on steep midslopes on loamy sands derived from granitic rocks. Aspects are northeast, east, and southeast. These stands tend to occur on the lee of ridges or concavities, perhaps where more snow accumulates than is the mode for the area.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Ceanothus velutinus*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Ceanothus velutinus*, *Prunus emarginata*, *Artemisia tridentata*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is characterized by a continuous canopy between 1–2 meters in height. *Ceanothus velutinus* (62.5% cover) and *Prunus emarginata* (20% cover) are the dominant shrub species. Several other shrub species may be present at very low cover values. These include *Symphoricarpos rotundifolius* (1.25% cover), *Artemisia tridentata*, *Eriogonum umbellatum*, and/or *Eriogonum elatum* (all 0.5% cover). The herbaceous layer is diverse but sparse. Common herbaceous associates include *Phacelia ramosissima*, *Crepis acuminata*, *Cryptantha echinella*, *Gayophytum ramosissimum*, *Lupinus argenteus*, *Monardella odoratissima*, *Wyethia mollis*, and/or *Osmorhiza occidentalis*. Scattered graminoids are present at very low cover values and may include *Elymus elymoides*, *Elymus trachycaulus*, *Achnatherum occidentale*, *Bromus carinatus*, and/or *Melica stricta*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Generally small stands that are widely scattered. Probably limited to the east slope of the Sierra Nevada.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: This association includes the former *Ceanothus velutinus* - *Artemisia tridentata*/*Wyethia mollis* association from the preliminary classification. Most stands of this alliance are known to respond to fire by prolific reseeding, in some cases emerging from a seed bank after many years. The local stands on the east side of the crest are probably no less dependent on fire even though the surrounding *Artemisia* and *Purshia* scrubs are not fire dependent. These local stands appear to favor mesic, snow-accumulating microsites where they are able to persist and form seed banks from which they do spring forth after the occasional fires in the sagebrush zone.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K67, 99K74, 99K79, 98M54, 99S66, 99S70

Artemisia cana/*Iris missouriensis* - *Juncus balticus* Shrubland [Provisional]

COMMON NAME

Silver Sagebrush/Stony Mountain Iris - Baltic Rush Shrubland

SYNONYM

None

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Evergreen shrubland

PHYSIOGNOMIC GROUP

Microphyllous evergreen shrubland

PHYSIOGNOMIC SUBGROUP
FORMATION

Natural/Seminatural
Temporarily flooded microphyllous shrubland

ALLIANCE

Artemisia cana Temporarily Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. Some ecological types described by Wexelman and Zemudio (1999) from the east slope of the Sierra closely resemble this association. *Artemisia cana* is a widespread species of temporarily or seasonally flooded settings in the intermountain west.

Yosemite and environs

Stands of this alliance are found in scattered locations to the east of the Sierra Nevada Crest.

ENVIRONMENTAL DESCRIPTION

Globally

Plant associations in this alliance occur at middle elevations (3,000–8,200 [occasionally to 9,800] feet). Precipitation varies across the range from less than 25 centimeters in semiarid basins of the western Great Basin to over 90 centimeters in moister meadow habitats of the Sierra Nevada and northern Stony Mountains. Most commonly, this alliance occurs on alluvial fans or alluvial terraces along mountain streams where soils are saturated in spring and water tables remain within

2–3 meters of the soil surface all year. In general, these communities show an affinity for mild topography, fine soils, and some source of subsurface moisture. Soils are typically formed in alluvium and have textures of silt loams and sandy loams. Adjacent vegetation varies from *Pinus contorta* forests in the mountains to *Artemisia tridentata* shrublands in semiarid basins and plains, to *Salix* spp. shrublands on terraces above riparian habitats. The hydrological divisions in the *Artemisia cana* group are poorly distinguished. In montane and subalpine meadows and valleys *Artemisia cana* plant associations are often the driest of the recognizable riparian habitats. This transitional position and the broad floodplains where these shrublands typically occur blur wetland/upland distinctions. Sarr (1995) noted two contiguous *Artemisia cana* communities in the Sierra Nevada that appeared to be upland and facultative wetland types based on habitat affinities of the understory layer. Most of these riparian stands have been placed in the *Artemisia cana* Temporarily Flooded Shrubland Alliance (A.843). Although these sites generally have seasonally saturated soils and shallow water tables, the true frequency of flooding is probably highly variable. Nearly all *Artemisia cana* communities are azonal (*sensu* Daubenmire 1970) and are associated with sites of above normal soil moisture.

Yosemite and environs

Stands of this association occur between 7,900–8,600 feet of elevation on gentle lower slopes or basin floors. Sites are seasonally or temporarily flooded. Soils are silty loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia cana*
Herbaceous *Iris missouriensis*, *Juncus balticus*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia cana*
Herbaceous *Iris missouriensis*, *Juncus balticus*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Artemisia cana dominates this association with 38 percent cover, forming an open canopy less than 0.5 meter in height. The herbaceous understory is dominated by *Iris missouriensis* (26% cover) with the graminoid *Juncus balticus* an important component (7.7% cover). Total herbaceous cover is quite high and roughly split between forbs and graminoids. Other forbs usually occur at low cover values (0.5%) and may include *Achillea millefolium*, *Arnica longifolia*, *Arnica parryi*, *Gayophytum diffusum*, *Navarretia breweri*, and/or *Potentilla glandulosa*. The graminoid species that may be present include *Poa pratensis* (7.5% cover), *Poa secunda*, *Carex praegracilis*, *Achnatherum lemmonii*, *Leymus triticoides*, *Elymus trachycaulus*, and/or *Agrostis variabilis*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Vegetation in this alliance is distinguished from the *Artemisia cana* shrub herbaceous alliance by the greater cover of shrubs (> 25% canopy cover) and the more regular flooding regime.

Yosemite and environs

This association signifies the repeated disturbance these sites have had from grazing and browsing of livestock. Both *Iris missouriensis* (poisonous to livestock) and *Juncus balticus* and/or *Juncus mexicanus* are indicators of heavily grazed palustrine areas.

Plots used to describe association (n=2)

USGS–NPS Veg Data: 99K88, 99S94

Artemisia arbuscula/Leptodactylon pungens Dwarf-shrubland [Provisional]

COMMON NAME Dwarf Sagebrush/Granite Prickly-Phlox Dwarf-Shrubland
SYNONYM Subalpine Upland Shrub Habitat (in part)
PHYSIOGNOMIC CLASS Dwarf-shrubland
PHYSIOGNOMIC SUBCLASS Evergreen dwarf-shrubland
PHYSIOGNOMIC GROUP Needle-leaved or microphyllous evergreen dwarf-shrubland
PHYSIOGNOMIC SUBGROUP Natural/Seminatural
FORMATION Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland

ALLIANCE *Artemisia arbuscula* Dwarf-shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

Similar associations are known from the subalpine regions of the Cascades, Warner Mountains, White, Inyo, and Sweetwater ranges in addition to the Sierra Nevada.

Yosemite and environs

This association is known from scattered locations throughout the eastern subalpine regions of the park and environs east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association prefers dry slopes and summits on talus or shallow soils between 5,900–11,800 feet of elevation.

Yosemite and environs

Stands of this association are found between 9,200–10,300 feet of elevation on gentle to moderate middle to upper slopes. Aspects are mostly southeast to southwest but on flatter sites may be variable. Soils are sands to silt loams, stony and derived from metamorphic parent material.

MOST ABUNDANT SPECIES

Globally

Shrub *Artemisia arbuscula*, *Ericameria discoidea*, *Leptodactylon pungens*, *Ribes cereum*
Herbaceous *Ipomopsis congesta*

Yosemite and environs

Shrub *Artemisia arbuscula*

CHARACTERISTIC SPECIES

Globally

Shrub *Artemisia arbuscula*, *Leptodactylon pungens*

Yosemite and environs

Shrub *Artemisia arbuscula*, *Leptodactylon pungens*

VEGETATION DESCRIPTION

Globally

This association has scattered shrubs emergent over an open ground layer composed of subshrubs, forbs, and graminoids. The canopy is less than 1 meter in height. *Artemisia arbuscula* is an important to dominant species. The subshrubs *Ericameria discoidea*, *Leptodactylon pungens*, and/or *Ribes cereum* may also be present along with the forb *Ipomopsis congesta*. Other common associates may include *Vaccinium caespitosum*, *Phlox pulvinata*, *Carex congdonii*, *Danthonia unispicata*, *Arabis lemmonii*, *Podistera nevadensis*, *Calamagrostis purpurascens*, *Holodiscus discolor*, *Sambucus racemosa*, *Artemisia rothrockii*, and/or *Stenotus acaulis*.

Yosemite and environs

This dwarf-shrubland has an open canopy dominated by *Artemisia arbuscula* (16.8% cover) with an understory of *Leptodactylon pungens* (2% cover). A trace of *Chrysothamnus viscidiflorus* is also sometimes present in the shrub layer. The herbaceous understory may be very diverse though sparse. The most common forbs present may include *Packera cana* (= *Senecio canus*), *Astragalus purshii* var. *lectulus*, *Castilleja applegatei*, *Crepis acuminata*, and/or *Erigeron clokeyi*. *Elymus elymoides* is the most common graminoid (0.25% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION This is probably a widespread type in the intermountain west.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Stands are locally restricted to the upper limits of the sagebrush zone on the east side of the crest. Stands are usually small "islands" surrounded by larger stands of *Artemisia tridentata* or *Purshia tridentata* alliance stands.

Plots used to describe association (n=4)

USGS-NPS Veg Data: 98K54, 98M111, 98M80, 99K64

Artemisia arbuscula - *Eriogonum microthecum* Dwarf-shrubland [Provisional]

COMMON NAME	Dwarf Sagebrush/Slender Wild Buckwheat Dwarf-Shrubland
SYNONYM	Subalpine Upland Shrub Habitat (in part)
PHYSIOGNOMIC CLASS	Dwarf-shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland
ALLIANCE	<i>Artemisia arbuscula</i> Dwarf-shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

Stands of this alliance are found in scattered locations throughout the subalpine and intermontane basin regions of Oregon, California, Idaho, and Nevada. This association is only known locally in the Yosemite region.

Yosemite and environs

This association has been described from subalpine locations outside the park, east of the Sierra Nevada crest, largely in the Virginia Lakes and Bridgeport Valley areas.

ENVIRONMENTAL DESCRIPTION

Globally

The vegetation in this alliance is best represented in cold, dry areas of the intermountain west between 3,300 and 12,500 feet in elevation. Precipitation ranges from 20–50 centimeters (150) annually, with a large proportion falling as winter snow. Soils are usually shallow, stony clays, often with an impenetrable layer at less than 60 centimeters depth. Poor drainage often leads to mounded water tables in the spring, which may control the distribution of this vegetation. Poor drainage may explain the occurrence of patches of *Artemisia arbuscula* dwarf-shrublands in *Pinus ponderosa* woodlands or *Artemisia tridentata* shrublands. This association may also be adjacent to *Juniperus* - *Pinus* woodlands, *Artemisia nova* shrublands, or *Cercocarpus ledifolius* woodlands.

Yosemite and environs

Stands of this association are found between 7,700–9,200 feet of elevation on gentle to steep slopes. Aspects are generally north, but may be variable on flatter sites. Soils are stony sands to silt loams derived from igneous or metamorphic parent materials. Precipitation ranges from 20–50 centimeters (150) annually, with a large proportion falling as winter snow.

MOST ABUNDANT SPECIES

Globally

Shrub *Artemisia arbuscula*
Herbaceous *Festuca idahoensis*, *Pseudoroegneria spicata*

Yosemite and environs

Shrub *Artemisia arbuscula*

CHARACTERISTIC SPECIES

Globally

Shrub *Artemisia arbuscula*
Herbaceous *Festuca idahoensis*, *Pseudoroegneria spicata*

Yosemite and environs

Shrub *Artemisia arbuscula*, *Eriogonum microthecum*
Herbaceous *Koeleria macrantha*

VEGETATION DESCRIPTION

Globally

Artemisia arbuscula is the dominant shrub, generally occurring with high constancy and 8–20 percent cover. Other shrub associates include *Artemisia tridentata*, *Chrysothamnus viscidiflorus*, *Gutierrezia sarothrae*, and/or *Purshia tridentata*. The herbaceous layer is typically of perennial grasses. Grasses often form the upper vegetation stratum and are often of greater cover than the shrub layer. Widespread and characteristic grass species include *Festuca idahoensis* and *Pseudoroegneria spicata*, which occur in stands from Oregon to Montana. More localized but important grass associates include *Elymus elymoides*, *Poa secunda*, *Koeleria macrantha*, *Achnatherum hymenoides*, and *Hesperostipa comata*.

Yosemite and environs

Stands near Yosemite are dominated by *Artemisia arbuscula* (15% cover) with traces of *Eriogonum microthecum*. *Chrysothamnus viscidiflorus* is also usually present at about 1 percent cover. The open herbaceous layer is dominated by perennial grasses, primarily *Elymus elymoides* (1.6% cover) and *Koeleria macrantha* (1.6% cover). Other common graminoid associates may include (in order of decreasing cover and constancy) *Achnatherum hymenoides*, *Poa secunda*, and/or *Achnatherum pinetorum*. A variety of forbs is present at low cover levels and constancy. The most common forb associates include *Stephanomeria spinosa*, *Astragalus purshii*, and/or *Leptodactylon pungens*. The height of this association is usually less than 0.5 meter, with the graminoids often taller than the shrubs and forbs.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2G3?

RANK JUSTIFICATION Stands of this alliance are known from many locations in the western United States, but this association may be localized in trans-Sierran California.

DATABASE CODE CEG001411?

COMMENTS

Globally

Yosemite and environs

This association is usually found at lower elevations on fine-grained soils than the previously described *Artemisia arbuscula/Leptodactylon pungens* association.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K91, 99K92, 99S67

Artemisia tridentata ssp. *tridentata*/Achnatherum *hymenoides* Shrubland [Provisional]

COMMON NAME	Basin Big Sagebrush/Indian Ricegrass Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Microphyllous evergreen shrubland
ALLIANCE	<i>Artemisia tridentata</i> ssp. <i>tridentata</i> Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found in the Great Basin scrub zone east of the Sierra Nevada crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found on gentle slopes between 7,300–7,700 feet of elevation. Aspects are north and east, and stands prefer toeslopes and basin floor topographic positions. Soils are well drained loamy sands to silty loams derived from igneous or metamorphic parent materials.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>
Herbaceous	<i>Achnatherum hymenoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata* ssp. *tridentata*
Herbaceous *Achnatherum hymenoides*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation type forms an open to intermittent canopy between 1–2 meters of height heavily dominated by *Artemisia tridentata* ssp. *tridentata* (50% cover). The graminoid *Achnatherum hymenoides* dominates the understory with 7.75 percent cover. Other subshrub associates that may be present at very low cover values (0.25%) include *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, and/or *Purshia tridentata*. *Achnatherum nevadense* and *Leymus cinereus* usually occur at 0.5 percent cover, and other occasional graminoid associates may include *Bromus tectorum* (exotic, 0.2% cover) and/or *Hesperostipa comata* (0.2% cover). Forbs are very sparse and may include trace amounts of *Cryptantha echinella*, *Gayophytum diffusum*, *Lupinus argenteus*, and/or *Tiquilia* sp.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: This association is poorly described and requires more samples before a good formal description should be accepted. Currently appears to be a sandy, deep soil type compared to other stands of *Artemisia tridentata* in the mapping area.

Plots used to describe association (n=2)

USGS–NPS Veg Data: 99S72, 99S79

***Artemisia tridentata* ssp. *vaseyana*/Monardella odoratissima Shrubland** [Provisional]

COMMON NAME	Mountain Big Sagebrush/Alpine Mountainbalm Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Microphyllous evergreen shrubland
ALLIANCE	<i>Artemisia tridentata</i> ssp. <i>tridentata</i> Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	3

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

All the documented stands of this association occur at relatively high elevations in Virginia Canyon.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association grows on moderate to steep west-facing slopes. Stands are concentrated at about 10,000 feet of elevation.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Monardella odoratissima</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
Herbaceous	<i>Monardella odoratissima</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is dominated by an open canopy of *Artemisia tridentata* (7% cover), with *Spiraea splendens* var. *splendens* (0.8% cover) as an occasional associate. The herbaceous layer is sparse but diverse. *Monardella odoratissima* is the dominant and diagnostic forb but only achieves 0.5 percent cover. *Erysimum capitatum* var. *perenne* and *Phacelia mutabilis* are also often present at about 0.1 percent cover. Several graminoids are represented in trace amounts in the herbaceous layer including *Elymus elymoides*, *Melica bulbosa*, *Bromus suksdorfii*, and/or *Achnatherum pinetorum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

More locations need to be found for this association. The stands occur at around 10,000 feet elevation and are adjacent to subalpine forest stands of *Pinus contorta* or *Pinus albicaulis*. Note: These samples were taken before subspecies of *Artemisia tridentata* were well recognized in California. These are probably *Artemisia tridentata* ssp. *vaseyana* stands but some uncertainty remains.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 53, 225, 259

***Purshia tridentata* - *Artemisia tridentata* - *Tetradymia canescens* Shrubland [Provisional]**

COMMON NAME Bitterbrush - Big Sagebrush - Spineless Horsebrush Shrubland

SYNONYM None

PHYSIOGNOMIC CLASS Shrubland

PHYSIOGNOMIC SUBCLASS Evergreen shrubland

PHYSIOGNOMIC GROUP Microphyllous evergreen shrubland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Microphyllous evergreen shrubland

ALLIANCE *Purshia tridentata* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is currently known from scattered locations east of the Sierra Nevada crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association typically grows on lower slopes that vary from gentle to steep. Aspects are south and east, and elevations range from 6,800–7,900 feet. Soils are sand to silt loams derived from igneous or metamorphic rocks.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata* ssp. *tridentata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata* ssp. *tridentata*, *Purshia tridentata*, *Tetradymia canescens*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is characterized by an intermittent shrub canopy codominated by *Artemisia tridentata* ssp. *tridentata* (31% cover) and *Purshia tridentata* (16% cover), with a small amount of *Tetradymia canescens* (1% cover). The canopy is generally less than 1 meter in height. Trace amounts of several herbaceous species may be present, primarily *Lupinus argenteus* (0.3% cover), *Phacelia ramosissima* (0.3% cover), *Castilleja applegatei* (0.2% cover), and/or *Balsamorhiza sagittata* (0.5% cover). Many graminoid species also provide trace amounts of cover. These may include *Elymus elymoides*, *Achnatherum hymenoides*, *Bromus tectorum* (exotic), *Hesperostipa comata*, and/or *Leymus cinereus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note that these descriptions linking the mixed *Artemisia tridentata* and *Purshia tridentata* plots with *Purshia tridentata* Alliance is substantiated by TWINSpan and cluster analysis. The general rule for membership in the *Purshia tridentata* Alliance used in the USNVC states dominance by *Purshia* as the criteria (NatureServe 2001).

Plots used to describe association (n=5)

USGS-NPS Veg Data: 99S82, 99S62, 99S63, 99S76, 99S87

***Purshia tridentata* - *Artemisia tridentata*/*Achnatherum hymenoides* Shrubland [Provisional]**

COMMON NAME	Bitterbrush – Big Sagebrush/Indian Ricegrass Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Microphyllous evergreen shrubland

ALLIANCE *Purshia tridentata* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is known from several locations near Mount Dana to the east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found between 6,500–7,800 feet of elevation on northeast to southeast aspects. Slopes vary from flat to somewhat steep, and stands prefer lower slope positions. Soils are sand to sandy loam, usually derived from granitic rock.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Purshia tridentata*, *Artemisia tridentata*
Herbaceous *Achnatherum hymenoides*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation is characterized by an open to intermittent short-shrub canopy between 0.5–1 meter in height. *Artemisia tridentata* (38% cover) and *Purshia tridentata* (7% cover) codominate, with trace amounts of *Chrysothamnus viscidiflorus* and *Prunus andersonii* often present. The herbaceous layer is sparse and dominated by graminoids. *Achnatherum hymenoides* is characteristic but averages only about 1–2 percent cover. Two forbs, *Gayophytum ramosissimum* and *Lupinus argenteus*, are often present in trace amounts. *Bromus tectorum* (exotic) is the most common graminoid contributing nearly 2 percent cover. Other common graminoids in order of declining importance include *Elymus elymoides*, *Leymus cinereus*, and/or *Achnatherum speciosum*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Purshia tridentata/*Achnatherum hymenoides* Shrubland (CEGL001058) in the USNVC is very similar to this association, though the environmental descriptors vary.

Yosemite and environs

The presence of *Achnatherum hymenoides* suggests a sandy substrate compared to other stands of this alliance in the area.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 98M40, 98M42, 99K60

***Purshia tridentata* - *Artemisia tridentata*/*Achnatherum nevadense* - (*Achnatherum nelsonii*) Shrubland [Provisional]**

COMMON NAME	Bitterbrush - Big Sagebrush/Nevada Needlegrass - (Nelson's Needlegrass) Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Microphyllous evergreen shrubland
ALLIANCE	<i>Purshia tridentata</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are only known from the Lundy quad area, along the Virginia Lakes Road, east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

The known stands of this association are found at 8,500–8,600 feet elevation on north to east aspects. Stands prefer moderate to steep upper slopes. The soils are well drained loamy sands derived from metamorphic or igneous rocks.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata*
Herbaceous *Achnatherum nevadense*, *Elymus elymoides*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Purshia tridentata*
Herbaceous *Achnatherum nelsonii*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This low, moderately dense (40–60% cover of shrubs) shrubland is codominated by *Purshia tridentata* (18% cover) and *Artemisia tridentata* (23% cover), which form an open to intermittent canopy between 0.5–1 meter in height. *Symphoricarpos rotundifolius* also contributes a trace of cover to the shrub canopy. The herbaceous layer is fairly sparse and dominated by graminoids. *Achnatherum nevadense* and *Elymus elymoides* each provide 2.5 percent cover. *Bromus carinatus*, *Bromus tectorum* (exotic), and/or *Leymus triticoides* may each provide up to about 0.5 percent cover. Forbs commonly found in this association in trace amounts include *Eriogonum spergulinum*, *Phacelia humilis*, *Phacelia ramosissima*, *Phlox stansburyi*, *Crepis acuminata*, *Cryptantha echinella*, *Mentzelia albicaulis*, *Navarretia breweri*, *Stephanomeria spinosa*, and/or *Viola purpurea*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Achnatherum nevadense is a polyploid derivative of *Achnatherum nelsonii* and *Achnatherum lettermanii*. More plots of this type need to be collected to confirm it as an association. This type is clearly related to *Purshia tridentata* - *Artemisia tridentata* - *Symphoricarpos rotundifolius* Shrubland but appears to be slightly more xeric (see next description).

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K71, 99K72, 99K73

***Purshia tridentata* - *Artemisia tridentata* - *Symphoricarpos rotundifolius* Shrubland [Provisional]**

COMMON NAME	Bitterbrush – Big Sagebrush – Roundleaf Snowberry Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Microphyllous evergreen shrubland

ALLIANCE *Purshia tridentata* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is known from three locations in the Lundy Canyon and Mill Creek watersheds within the environs east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this vegetation are found between 7,200–8,200 feet of elevation on moderate to steep slopes. Aspects are variable, and stands prefer low and midslopes. Soils are sandy or silt loams derived from igneous or metamorphic rock.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Artemisia tridentata*, *Purshia tridentata*, *Symphoricarpos rotundifolius*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation is characterized by an open to intermittent shrub canopy between 1–5 meters in height dominated by *Artemisia tridentata* (37% cover). *Purshia tridentata* (8.7% cover), *Symphoricarpos rotundifolius* (0.5% cover), and *Cercocarpus ledifolius* (0.5% cover) complete the shrub canopy. Emergent individuals of *Pinus jeffreyi* may be present. The herbaceous layer is rather sparse and dominated by forbs. *Wyethia mollis*, *Castilleja applegatei*, *Calochortus superbus*, *Lupinus argenteus*, *Descurainia californica*, and/or *Castilleja pilosa* each provide a scant amount of cover. The most common graminoid species are *Bromus carinatus* and *Achnatherum nevadense*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type and *Purshia tridentata*/*Achnatherum nevadense* - (*Achnatherum nelsonii*) Shrubland are clearly related and may be lumped with further field data collection and analysis.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K80, 99S58, 99S59

***Purshia tridentata* - *Artemisia tridentata*/*Eriogonum umbellatum* Shrubland [Provisional]**

COMMON NAME	Bitterbrush - Big Sagebrush/Sulphurflower Wild Buckwheat Shrubland
SYNONYM	None
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Microphyllous evergreen shrubland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Microphyllous evergreen shrubland
ALLIANCE	<i>Purshia tridentata</i> Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are scattered throughout the park and environs east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found between 7,200–10,100 feet of elevation. Aspects do not seem to differentiate this type. Slopes are moderate to steep, and stands prefer lower slopes and midslopes. Soils are sandy to silt loams derived from granitic and other igneous rock.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Purshia tridentata*, *Artemisia tridentata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Purshia tridentata*
Sub-shrub *Eriogonum umbellatum*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This vegetation forms an open to intermittent canopy between 0.5–2 meters in height. The canopy is co-dominated by *Purshia tridentata* (13% cover) and *Artemisia tridentata* (average 22% cover and 80% constancy). *Eriogonum umbellatum* is the diagnostic sub-shrub in the subcanopy, contributing 1.5 percent cover. Other common shrub associates contributing small amounts of cover may include *Chrysothamnus viscidiflorus*, *Tetradymia canescens*, *Prunus andersonii*, *Eriogonum davidsonii*, *Leptodactylon pungens*, and/or *Ribes velutinum*. The herbaceous layer is sparse and cover is split fairly equally between graminoids and forbs. The most common forb associates include *Lupinus argenteus*, *Phacelia ramosissima*, *Eriastrum wilcoxii*, *Mentzelia congesta*, *Phacelia bicolor*, and/or *Stephanomeria exigua*, each contributing less than 1 percent cover. The most common graminoids include *Achnatherum hymenoides* (1.1% cover), *Elymus elymoides* (1.1% cover), and/or *Bromus tectorum* (0.5% cover, exotic).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This type appears to be a slightly rockier and drier association than *Purshia tridentata* - *Artemisia tridentata* - *Symphoricarpos rotundifolius* Shrubland.

Plots used to describe association (n=5)

USGS-NPS Veg Data: 98K37, 98K38, 98K42, 98K45, 98K79

***Salix exigua/Juncus* spp. Shrubland [Provisional]**

COMMON NAME

Coyote Willow - Rush Species Shrubland

SYNONYM

Narrow-Leaf Willow Series (in part)

PHYSIOGNOMIC CLASS

Shrubland

PHYSIOGNOMIC SUBCLASS

Deciduous shrubland

PHYSIOGNOMIC GROUP

Cold deciduous shrubland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Temporarily flooded cold deciduous shrubland

ALLIANCE

Salix (exigua, interior) Temporarily Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Palustrine

RANGE

Globally

This association is known from the Great Plains, Stony Mountains, and the intermountain semidesert west.

Yosemite and environs

Stands of this association are known from east of the vicinity of Mount Dana in Lee Vining Canyon.

ENVIRONMENTAL DESCRIPTION

Globally

This association generally occurs along backwater channels and other perennially wet but less scoured sites such as floodplain swales and irrigation ditches. In Nebraska, this community is found on sandbars, islands, and shorelines of stream channels and braided rivers.

Yosemite and environs

Stands have been found on the wet edges of meadows and along narrow basins that have high water-holding capacity.

MOST ABUNDANT SPECIES

Globally

Shrub *Salix exigua*

Yosemite and environs

Shrub *Salix exigua*

CHARACTERISTIC SPECIES

Globally

Shrub *Salix exigua*

Yosemite and environs

Shrub *Salix exigua*

VEGETATION DESCRIPTION

Globally

This vegetation is quite variable and is dominated by perennial shrubs and grasses about 1 meter tall. *Salix exigua* is the common shrub. Others include saplings of *Populus deltoides* or *Salix amygdaloides*, *Salix eriocephala*, *Salix lutea*, and *Amorpha fruticosa*. Tall perennial grasses can appear to codominate the stand. Herbaceous species include *Bidens* spp., *Eleocharis* spp., *Juncus* spp., *Lobelia siphilitica*, *Lycopus americanus*, *Lythrum alatum*, *Polygonum* spp., *Schoenoplectus pungens* (= *Scirpus pungens*), *Sphenopholis obtusata*, and *Xanthium strumarium*. Diagnostic features of this association include the nearly pure stands of *Salix exigua* shrubs, with a dense ground layer of at least 30 percent cover of graminoids and forbs.

Yosemite and environs

Stands in the vicinity of Yosemite form a canopy of *Salix exigua* (63% cover) between 2–5 meters in height. Up to 20 percent cover of emergent *Salix exigua* may be present, to 10 meters in height. The ground layer is densely covered with graminoids and forbs, primarily *Juncus* and *Carex* species. Forb species may include *Agrostis gigantea* (exotic, 7.5% cover), *Achillea millefolium*, *Arnica longifolia*, *Castilleja miniata*, *Hordeum brachyantherum*, *Iris missouriensis*, and/or *Solidago spectabilis*. Graminoids commonly present include *Carex aquatilis* var. *aquatilis* (7.5% cover), *Carex lanuginosa* (7.5% cover), *Carex lenticularis* (7.5% cover), *Festuca idahoensis* (7.5% cover), *Juncus nevadensis* (7.5% cover), *Juncus macrandrus* (1.25% cover), and/or *Phleum alpinum* (1.25% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5?

RANK JUSTIFICATION

DATABASE CODE CEG001203?

COMMENTS

Globally

Yosemite and environs

These stands appear to match descriptions for *Salix exigua*/Mesic Graminoids Shrubland (CEG001203) from the USNVC. This vegetation type needs more samples to confirm it as an association and to refine relationships with other types in the USNVC.

Plots used to describe association (n=2)

USGS–NPS Veg Data: 98K40, 98K49

FORESTS AND WOODLANDS OF ECOLOGICAL ZONES VII AND VIII

***Populus tremuloides*/Artemisia tridentata Forest [Provisional]**

COMMON NAME	Quaking Aspen/Big Sagebrush Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest
PHYSIOGNOMIC GROUP	Cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Montane or boreal cold deciduous forest

ALLIANCE *Populus tremuloides* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is known from the montane areas of the western United States including Wyoming, California, Utah, Nevada, and Idaho.

Yosemite and environs

Stands of this association are found throughout the montane regions of the park.

ENVIRONMENTAL DESCRIPTION

Globally

This association is found on seasonally saturated soils on lower to middle slopes. Elevations range from 5,900–10,000 feet.

Yosemite and environs

This association is found on seasonally saturated soils on lower to middle slopes. Elevations range from 6,600–9,200 feet. Aspects are generally north and east. Soils are shallow loams derived from igneous rock.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Populus tremuloides</i>
Shrub	<i>Artemisia tridentata</i>

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

Tree *Populus tremuloides*
Shrub *Artemisia tridentata*

Yosemite and environs

Tree *Populus tremuloides*
Shrub *Artemisia tridentata*

VEGETATION DESCRIPTION

Globally

This association is characterized by *Populus tremuloides* as the dominant species in the tall-shrub or tree canopy. *Artemisia tridentata* is the dominant shrub or an important shrub. More information is not available at this time.

Yosemite and environs

This association is characterized by *Populus tremuloides* as the dominant species in the tall-shrub or tree canopy, with an average cover of 30 percent. The canopy varies from 10–30 meters in height. Occasional emergent conifers like *Pinus monticola* and/or *Pinus jeffreyi* may be present. *Artemisia tridentata* is the dominant shrub with an average cover of 4.5 percent. Other shrubs may include *Symphoricarpos rotundifolius* (2.5% cover) and *Rosa woodsii* (0.5% cover). *Gayophytum diffusum* is the most common forb, though it is present in only half of the stands and at less than 1 percent cover. Several graminoid species may be present at low cover values including *Elymus elymoides*, *Bromus carinatus*, and/or *Bromus tectorum* (exotic).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4

RANK JUSTIFICATION This association is fairly widespread but not very common. There is concern about its long-term viability.

DATABASE CODE CEG000572

COMMENTS

Globally

Yosemite and environs

Note: This is a "generic" association that lacks several diagnostic species of other aspen-sagebrush associations. With further sampling and comparison with other Great Basin aspen stands, some revision of these associations may be in order. See comments on other aspen associations below.

Plots used to describe association (n=5)

USGS–NPS Veg Data: 99S78, 99S83, 99S96, 98K48, 99K81

***Populus tremuloides*/Monardella odoratissima Forest**

COMMON NAME	Quaking Aspen/Alpine Mountainbalm Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest
PHYSIOGNOMIC GROUP	Cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Montane or boreal cold deciduous forest

ALLIANCE *Populus tremuloides* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is known from the Sierra Nevada ranging throughout the southern and eastern portions of the range. It is particularly common on the east side north of Bridgeport (Potter, 1998).

Yosemite and environs

This association is scattered throughout the montane regions of the park on either side of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is typically located on middle and lower slopes. Slopes are gentle (< 25% slope), often on southwest or southeast exposures. Stands usually have low rock cover; moderately high to high solar radiation; deep, essentially well drained soils of loam to clay texture; and soils derived from volcanic, granitic, and mixed parent materials. Elevations range from 6,920–9,100 ft.

Yosemite and environs

Stands of this association are found between 6,900–9,200 feet of elevation on southeastern to northwestern exposures. Slopes are gentle to moderate, and soils are fairly deep, well drained loams.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Populus tremuloides</i>
Shrub	<i>Populus tremuloides</i>
Herbaceous	<i>Collinsia torreyi</i>

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Populus tremuloides</i>
Herbaceous	<i>Collinsia torreyi</i>

CHARACTERISTIC SPECIES

Globally

Tree	<i>Populus tremuloides</i>
Shrub	None
Herbaceous	<i>Monardella odoratissima</i>

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Monardella odoratissima</i>

VEGETATION DESCRIPTION

Globally

This association is usually a mixed hardwood type with both *Populus tremuloides* and various conifers, such as *Abies magnifica* and *Pinus contorta*, comprising the canopy averaging between 33 and 85 percent. Total vegetation cover is high (70–100%) from resulting high cover of the tree shrub and herbaceous layers. Shrubs include *Symphoricarpos mollis*, *Artemisia tridentata*, and *Symphoricarpos rotundifolius*. Forbs and grasses are common and include *Monardella odoratissima*, *Elymus elymoides*, *Wyethia mollis*, *Thalictrum fendleri*, *Bromus marginatus*, and *Poa bolanderi*.

Yosemite and environs

This association is dominated by *Populus tremuloides* in the canopy as a tall shrub or tree averaging 40 percent cover. At least one of several conifer species is present. Potter (1994) describes two phases, mesic and dry. Conifer species may include *Abies magnifica* (21% cover), *Pinus jeffreyi* (16% cover), and/or *Juniperus occidentalis* (9% cover), depending on soil moisture. Common shrub associates include *Prunus emarginata* (4% cover) and *Artemisia tridentata* (4% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

RANK JUSTIFICATION Many aspen stands in California are threatened by grazing and by improper fire regime allowing invasion and overtaking of stands by conifers.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

All of the eastside aspen associations defined herein are probably closely related ecologically. Potter's (1994) description of this type includes some eastside stands that we might call other types such as *Populus tremuloides*/*Artemisia tridentata* Forest and *Populus tremuloides*/*Artemisia tridentata*/*Monardella odoratissima* - *Kelloggia galioides* Forest. The exact relationships of these types remain to be seen. We have chosen to distinguish the nuances here because we feel that throughout the intermountain west there are a number of aspen associations that mix with *Artemisia tridentata* and the subregional variants should be distinguished. With further samples and analysis throughout this region, we would see a clearer picture of the ecological relationships between these types.

Plots used to describe association (n=2)

USGS–NPS Veg Data: 99S144 98K50

Potter (1998): has 19 plots sampled throughout the Sierra Nevada

Populus tremuloides/*Artemisia tridentata*/*Monardella odoratissima* - *Kelloggia galioides* Forest [Provisional]

COMMON NAME	Quaking Aspen/Big Sagebrush/Alpine Mountainbalm - Milky Kelloggia Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest
PHYSIOGNOMIC GROUP	Cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Montane or boreal cold deciduous forest
ALLIANCE	<i>Populus tremuloides</i> Forest Alliance
CLASSIFICATION CONFIDENCE LEVEL	2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found in scattered locations throughout the eastside portions of the of the park. Occasional stands may occur in west side locations.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found between 6,900–8,900 feet of elevation on northern and eastern aspects. Stands are found on lower to middle, moderate to steep slopes. Soils are moderate to well drained sandy loams derived from granitic or metamorphic rock. Stands are primarily found east of the Sierra Nevada crest.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Monardella odoratissima</i> , <i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Monardella odoratissima</i> , <i>Kelloggia galioides</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is dominated by *Populus tremuloides* as a tall shrub or tree. The canopy averages about 18 percent cover, and varies between 5–10 meters in height. Emergent individuals of *Pinus contorta* are often present. *Artemisia tridentata* is the dominant shrub with an average cover of 13 percent. Other common shrub associates include *Salix scouleriana* (9.5% cover), *Prunus emarginata* (3.8% cover), *Symphoricarpos rotundifolius* (0.875% cover), *Ceanothus velutinus* (0.75% cover), and/or *Purshia tridentata* (0.75% cover). *Monardella odoratissima* (3.87% cover) and/or *Kelloggia galioides* (0.25% cover) each occur in the herbaceous layer with a 0.5 frequency. *Wyethia mollis* (0.25% cover) is also sometimes present. The graminoids *Elymus elymoides* (4.6% cover) and *Bromus carinatus* (0.5% cover) are present in every stand.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K98, 99K77, 99S122, 99K97, 99S61

Wieslander: 511

Populus tremuloides - *Pinus jeffreyi* Forest

COMMON NAME	Quaking Aspen - Jeffrey Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest
PHYSIOGNOMIC GROUP	Cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Montane or boreal cold deciduous forest

ALLIANCE *Populus tremuloides* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found mostly east of the park in the Buckeye Creek, Lee Vining Creek, Twin Lakes, June Lake, and other drainages flowing to the Great Basin.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found on seasonally saturated soils on gentle to moderate lower slopes within or adjacent to narrow stream floodplains. Stands can occur on all aspects. This association seems to be confined to a fairly narrow elevation band, between 7,000–8,000 feet. Soils are usually well drained loams and loamy sands.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Rosa woodsii</i>
Herbaceous	<i>Allium campanulatum</i> , <i>Leymus cinereus</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i> , <i>Pinus jeffreyi</i>
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VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This forest forms a canopy between 10–35 meters. *Pinus jeffreyi* dominates with 45 percent cover, and *Populus tremuloides* contributes 28 percent cover. Emergent individuals of *Pinus jeffreyi* are common. The shrub canopy is fairly sparse. *Artemisia tridentata* (1.5% cover) is present in nearly all stands. *Rosa woodsii* (10% cover), *Symphoricarpos rotundifolius* (4.5% cover), and *Cercocarpus ledifolius* (0.25% cover) are usually present. The herbaceous layer is sparse but diverse. The most common forbs include *Allium campanulatum* (0.88% cover), *Descurainia californica* (0.38% cover), *Osmorhiza berteroi* (0.25% cover), and/or *Phacelia ramosissima* (0.25% cover). Several graminoid species may be present including *Leymus cinereus* (4% cover), *Bromus laevipes* (1.3% cover), *Bromus tectorum* (exotic with 1.3% cover), *Poa pratensis* (0.88% cover), *Elymus elymoides* (4.38% cover), and/or *Elymus glaucus*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This association, though related to other aspen types in the east side of the area, appears distinct in the TWINSpan classification. The stands usually signify narrow riparian stringers adjacent to slopes with coniferous forest (often *Pinus jeffreyi*-dominated).

Plots used to describe association new (n=7)

USGS-NPS Veg Data: 98M58, 98M46, 98K56, 98M56, 99S86
Wieslander: 92, 198

***Populus tremuloides*/Poa pratensis Forest [Provisional]**

COMMON NAME Quaking Aspen/Kentucky Bluegrass Forest

SYNONYM None

PHYSIOGNOMIC CLASS Forest

PHYSIOGNOMIC SUBCLASS Deciduous forest

PHYSIOGNOMIC GROUP Cold deciduous forest

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Montane or boreal cold deciduous forest

ALLIANCE *Populus tremuloides* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. Stands having these features have been described by Wexelman and Zemudio (1999) in the Carson and Walker river drainages of California and Nevada.

Yosemite and environs

This association is only known from one stand in Lundy Canyon. It is expected in eastside meadows and riparian settings.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found at 8,340 feet on the lower portion of a moderate slope. The aspect is southerly, and the soil is a poorly drained sandy loam derived from granite.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Populus tremuloides</i>
Herbaceous	<i>Poa pratensis</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Populus tremuloides</i>
Herbaceous	<i>Poa pratensis</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association forms a tree and/or tall-shrub canopy dominated by *Populus tremuloides* with up to 63 percent cover. Other shrubs present may include *Juniperus osteosperma* (0.5 % cover), *Ribes viscosissimum* (0.5% cover), *Symphoricarpos rotundifolius* (0.5% cover), and/or *Artemisia tridentata* (0.5% cover). The ground layer is dominated by graminoids, specifically *Poa pratensis* with 37.5 percent cover. Other graminoids present may include *Elymus elymoides* (2.5% cover) and/or *Leymus triticoides* (2.5% cover). The herbaceous layer is sparse. *Allium bisceptrum* may be present.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G1?

RANK JUSTIFICATION Only one stand of this association has ever been found.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Further plots are needed to substantiate this type. However, reconnaissance on the east side suggests that it is common in aspen stands, subjected to grazing over time.

Plots used to describe association (n=1)

USGS–NPS Veg Data: 99S60

***Populus tremuloides*/Rosa woodsii Forest [Provisional]**

COMMON NAME	Quaking Aspen/Woods' Rose Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Deciduous forest
PHYSIOGNOMIC GROUP	Cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Montane or boreal cold deciduous forest

ALLIANCE *Populus tremuloides* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found at scattered locations throughout the eastern regions of the park and environs, primarily within the Great Basin scrub zone.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this forest are found between 6,700–7,600 feet of elevation. Aspects are east, and stands prefer gentle to moderate lower slopes, streamsides, and basins, which are seasonally saturated or flooded. Soils vary from loamy sands to clay.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i>
Shrub	<i>Rosa woodsii</i>
Herbaceous	<i>Maianthemum stellatum</i> , <i>Poa pratensis</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i>
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Shrub *Rosa woodsii*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association forms an open to closed canopy of *Populus tremuloides* between 5–30 meters in height. *Rosa woodsii* provides the most cover in the shrub layer (5% cover), though *Artemisia tridentata* (0.67% cover) has the highest frequency. *Salix exigua* is also common in the shrub layer (5% cover). The herbaceous layer is quite diverse and can be rather dense. *Maianthemum stellatum* (3.5% cover) is the most frequent forb. Other common herbaceous associates may include *Equisetum arvense* (0.67% cover), *Achillea millefolium* (0.33% cover), *Aquilegia formosa* (0.57% cover), and/or *Iris missouriensis* (0.25% cover). Many graminoids can be present in this vegetation type, often achieving more than 25 percent cover. The most common graminoid species include *Poa pratensis* (exotic, 14.17% cover), *Leymus cinereus* (0.92% cover), *Leymus triticoides* (0.92% cover), and/or *Carex pellita* (0.58% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

A similar forest type is documented from Wyoming *Populus tremuloides*/*Spiraea betulifolia* Forest (CEGL000601).

Yosemite and environs

Rosa woodsii is not considered to be a good indicator of high-quality riparian sites (Wexelman and Zemudio 1999). It is probably proper to infer that such stands are the result of impacts of livestock grazing and perhaps other riparian impacts.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 98K46, 99K54, 99K86, 99K93, 99S57, 99S64

***Populus balsamifera* ssp. *trichocarpa* - *Pinus jeffreyi* Forest [Provisional]**

COMMON NAME	Black Cottonwood - Jeffrey Pine Forest
SYNONYM	None
PHYSIOGNOMIC CLASS	Forest
PHYSIOGNOMIC SUBCLASS	Mixed evergreen deciduous forest
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold deciduous forest
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Mixed needle-leaved evergreen - cold deciduous forest

ALLIANCE

Populus balsamifera Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found in the eastern region of the park and environs including Lee Vining Creek and Mill Creek.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This forest type grows between 6,900–7,780 feet elevation on gentle to moderate slopes with southerly to southeasterly exposures. Stands are found in valley bottoms along streams or occasionally midslopes with soils that are seasonally or permanently flooded. Soils are sands to silty loams derived from igneous rock and may be moderately well drained to well drained.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i> , <i>Populus balsamifera</i> ssp. <i>trichocarpa</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Poa pratensis</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus balsamifera</i> ssp. <i>trichocarpa</i> , <i>Pinus jeffreyi</i>
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VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This forest is characterized by a broken tall canopy of *Pinus jeffreyi* 15–35 meters tall. In well developed stands *P. jeffreyi* forms an emergent or open overstory over a subcanopy of *Populus balsamifera*. Both species average about 34 percent cover each. Trees and saplings of *Populus tremuloides* and *Abies concolor* are also present. Individuals of *Juniperus occidentalis* may also be present in low cover. Occasionally *Pinus jeffreyi* may also be present as smaller trees or saplings. The shrub layer is dominated by *Rosa woodsii* (10% cover) with *Artemisia tridentata* and/or *Symphoricarpos rotundifolius* both averaging about 6 percent cover. The ground layer is dominated by graminoids. The herbaceous layer

is sparse but relatively diverse. Most stands contain low cover of *Poa pratensis* and *Elymus elymoides*. *Wyethia mollis*, *Allium bisceptrum*, *Calochortus superbus*, *Iris missouriensis*, and/or *Maianthemum stellatum* occur infrequently.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Similar stands may range northward to the Modoc Plateau on the east side of the Warner Mountains, but these are uncommon and of limited extent.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

These are riparian stands that occur at the edges of *Pinus jeffreyi* - *Abies concolor*/*Artemisia tridentata* - *Symphoricarpos rotundifolius*/*Elymus elymoides* Forest. *Populus balsamifera* seems to prefer relatively high-gradient creeksides within these forested zones on the east side of Yosemite. These are usually narrow stringer communities bordering on the adjacent forests of Jeffrey pine and white fir.

Plots used to describe association (n=3)

USGS-NPS Veg Data: 98M55, 98M49, 98M50

***Populus tremuloides*-*Pinus contorta*/*Artemisia tridentata*/*Poa pratensis* Forest [Provisional]**

COMMON NAME **Quaking Aspen-Lodgepole Pine/Big Sagebrush/Kentucky Bluegrass Forest**

SYNONYM **None**

PHYSIOGNOMIC CLASS Forest

PHYSIOGNOMIC SUBCLASS Mixed evergreen deciduous forest

PHYSIOGNOMIC GROUP Mixed needle-leaved evergreen – cold-deciduous forest

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Mixed needle-leaved evergreen – cold-deciduous forest

ALLIANCE *Populus tremuloides* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory. A similar association, *Pinus contorta* var. *murrayana* - *Populus tremuloides*/*Spiraea douglasii* Forest, has been defined for the northeastern Sierra, Modoc Plateau, and Blue Mountains of Oregon (NatureServe 2001).

Yosemite and environs

This association is found in the eastern portion of the mapping area on the east slope of the range, including Lee Vining Creek, Parker Creek, Walker Creek, Lundy Canyon, Virginia Creek Canyon, and Bloody Canyon,

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This forest type grows between 7,000–9,000 feet of elevation on northeast, east and southeast aspects. Stands are found in flood plains of valley bottoms or along streams with soils that are seasonally or permanently flooded. Soils are rapidly to somewhat poorly drained sands to silty loams derived from granite. Stands are not typically rocky. Substrates may have 0 – 40 % bare soil exposure and high leaf litter cover ranging from 20 – 98 %.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Poa pratensis</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Populus tremuloides</i> , <i>Pinus contorta</i> var. <i>murrayana</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Poa pratensis</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This forest is characterized by a fairly continuous to fairly open canopy of *Populus tremuloides* (25% cover) and *Pinus contorta* (19% cover) between 15–30 meters of height. Individuals of *Pinus contorta* are sometimes emergent to 35 meters. Often *Pinus jeffreyi* is present as trees or saplings. The shrub layer is open with *Artemisia tridentata* (4% cover). Other important shrubs may include *Rosa woodsii* (4.6% cover) and/or *Symphoricarpos rotundifolius* (1.8% cover). The ground layer is dominated by graminoids. Most stands contain about 10 percent cover of *Poa pratensis* and 6 percent cover of *Bromus carinatus*. Other graminoids that may be present at low cover values include *Elymus trachycaulus* (2.5%) *Bromus tectorum* (exotic), *Elymus elymoides*, and/or *Leymus cinereus*. The herbaceous layer is sparse but relatively diverse. *Achillea millefolium*, *Taraxacum officinale* (exotic), *Wyethia mollis*, *Allium bisceptrum*, *Calochortus superbis*, *Iris missouriensis*, and/or *Maianthemum stellatum* all occur at about 0.5 percent cover with 33 to 66 percent frequency.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

A similar association has been defined for the Columbia Plateau and northern Great Basin, that is, *Pinus contorta* var. *murrayana* - *Populus tremuloides*/*Spiraea douglasii* Forest (CEGL000157).

Yosemite and environs

This is another ecological relative of the several eastside aspen associations. Potter (1994) treats all of his stands with aspen, lodgepole pine, and sagebrush in the *Populus tremuloides*/*Monardella odoratissima* association. We have broken out the various additional stands we've sampled into several related associations. It is also uncertain whether we should treat this association as a member of the aspen alliance, the lodgepole pine alliance, or a mixed aspen lodgepole pine alliance. The preliminary classification unit, *Pinus contorta* - *Populus tremuloides* - *Pinus jeffreyi*, is now included in this association. Stands dominated by *Populus tremuloides* and *Pinus contorta* have been observed in the subalpine zone on the west slope, but insufficient samples are available to place those stands in this association.

Plots used to describe association (n=5)

USGS-NPS Veg Data: 99S65, 99K57, 99K84, 99K85, 98M52

***Juniperus occidentalis* var. *australis* - *Cercocarpus ledifolius*/*Artemisia tridentata* Woodland [Provisional]**

COMMON NAME Western Juniper - Curleaf Mountain-Mahogany/Big Sagebrush Woodland

SYNONYM None

PHYSIOGNOMIC CLASS Woodland

PHYSIOGNOMIC SUBCLASS Evergreen woodland

PHYSIOGNOMIC GROUP Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP Natural/Seminatural

FORMATION Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Juniperus occidentalis* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found throughout the Great Basin scrub region of the environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found between 7,500–8,400 feet of elevation. Stands grow on all aspects on moderate to steep midslopes. Soils are silty loams to loamy sands derived from granitic and metamorphic parent materials.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Juniperus occidentalis</i> var. <i>australis</i>
Shrub	<i>Cercocarpus ledifolius</i>
Herbaceous	<i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the eastern side of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Juniperus occidentalis</i> var. <i>australis</i>
Shrub	<i>Cercocarpus ledifolius</i> , <i>Artemisia tridentata</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the eastern side of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association forms an open to intermittent tree canopy between 10–20 meters of height. *Juniperus occidentalis* var. *australis* dominates the canopy with 12 percent cover, while *Pinus monophylla* often contributes another 4 percent cover to the canopy or as emergent individuals. The shrub or short-tree layer is open with *Cercocarpus ledifolius* dominant with 20.6 percent cover. *Artemisia tridentata* is also important with 2 percent cover. Other shrubs present may include *Symphoricarpos rotundifolius* (1.4% cover), *Eriogonum umbellatum* (0.9% cover), *Leptodactylon pungens* (0.375% cover), *Purshia tridentata* (0.75% cover), *Holodiscus discolor* (0.25% cover), and/or *Ribes velutinum* (0.25% cover). The ground layer is open to sparse seldom achieving more than 20 percent cover, and graminoids dominate the stratum. Graminoid species that may be present include *Elymus elymoides* (1% cover), *Melica stricta* (0.375% cover), *Poa secunda* (0.75% cover), and/or *Achnatherum hymenoides* (0.25% cover). *Penstemon speciosus* (0.25% cover) is the only forb which attains any appreciable cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Likely to occur on the east side of the Sierra Nevada crest on slopes bordering the Great Basin as far south as Kern County.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=4)

USGS–NPS Veg Data: 99K96, 99S73, 99S93, 98M51

***Juniperus occidentalis* var. *australis*/Artemisia tridentata Woodland**

COMMON NAME

Western Juniper/Big Sagebrush Woodland

SYNONYM

None

PHYSIOGNOMIC CLASS

Forest

PHYSIOGNOMIC SUBCLASS

Evergreen woodland

PHYSIOGNOMIC GROUP

Temperate or subpolar needle-leaved evergreen woodland

PHYSIOGNOMIC SUBGROUP

Natural/Seminatural

FORMATION

Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE

Juniperus occidentalis Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM

Upland

RANGE

Globally

This association is known from the Sierra Nevada, ranging from the Lake Tahoe area south to at least Kaiser Pass (southern Sierra). It is primarily an eastside association but is known from the west side from Sonora Pass south (Potter, 1998).

Yosemite and environs

This association is found in scattered locations in the eastern subalpine portions of the environs.

ENVIRONMENTAL DESCRIPTION

Globally

This association is a xeric middle to high elevation type. Stands generally range between 7,500–8,500 feet and occur on southeast and southwest aspects. Slopes are commonly less than 30 percent. It is typically found on upper slopes and ridges. Stress indexes are higher than most other vegetation in the montane zone.

Yosemite and environs

This association is found from 7,800–9,300 feet of elevation on southern and eastern aspects. Stands grow on gentle to steep, lower to middle slopes. Soils are well drained sands to silt loams derived from granite.

MOST ABUNDANT SPECIES

Globally

Tree	<i>Juniperus occidentalis</i> , <i>Pinus jeffreyi</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Collinsia torreyi</i> var. <i>wrightii</i>

Yosemite and environs

Tree	<i>Juniperus occidentalis</i>
Shrub	<i>Artemisia tridentata</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Juniperus occidentalis</i>
Shrub	<i>Artemisia tridentata</i>

VEGETATION DESCRIPTION

Globally

This association forms open woodlands with a shrubby understory of *Artemisia tridentata*. Total vegetative cover is high due to abundant understory species. The principal tree species are *Juniperus occidentalis* (16% cover), *Pinus jeffreyi* (10%), *Pinus contorta* (16%); shrubs are *Artemisia tridentata* (16%), *Ribes cereum* (4%), *Symphoricarpos parishii* (4%), and *Ceanothus cordulatus* (8%). Herbs include *Monardella odoratissima* (4%), *Erysimum capitatum* var. *perenne* (= *Erysimum perenne*) (1%), *Gayophytum eriospermum* (6%), and *Castilleja applegatei* (2%).

Yosemite and environs

This association is characterized by an open tree canopy between 5–20 meters in height. *Juniperus occidentalis* dominates the canopy with 30 percent cover. *Pinus contorta* and/or *Pinus jeffreyi* are occasional associates contributing up to 10 percent cover. The shrub layer is open to intermittent with *Artemisia tridentata* (15% cover) as the dominant shrub. Other shrubs commonly present are *Purshia tridentata* (6% cover) and *Symphoricarpos rotundifolius* (10% cover). The ground layer is sparse and dominated by graminoids. Typical species include *Achnatherum hymenoides* (1% cover), *Bromus tectorum* (exotic with 1% cover), *Elymus elymoides* (1% cover), and *Leymus cinereus* (1% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION Increased fire frequency has a negative effect on this association.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is similar to *Juniperus occidentalis*/*Artemisia tridentata* ssp. *vaseyana* Woodland (CEGL000723). This is a low-productivity, largely eastside type similar and related to the *Juniperus occidentalis* association, more common on the west side.

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99S146, 99K90, 99S147

Wieslander: 165, 289, 480

***Pinus jeffreyi* - *Pinus monophylla* Woodland**

COMMON NAME	Jeffrey Pine - Singleleaf Pinyon Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is uncommon in Yosemite and environs and occurs on the eastside slopes.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of the association is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, elevations range from 7,000–7,700 feet, and aspects are eastern. This association is found in low to middle slope positions, primarily near intermittent creeks. Soils are well drained loamy sands derived primarily from volcanic, granitic, or metamorphic parent materials. Bare soil ranges from 20–75 percent. Sites are upland or riparian.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs to date. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus jeffreyi</i> , <i>Pinus monophylla</i>
Shrub	<i>Artemisia tridentata</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus jeffreyi*, *Pinus monophylla*

VEGETATION DESCRIPTION

Globally

This association is only described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, this association is characterized by tree cover of up to 60 percent in the 35–50 meter height class, although most stands have a lower canopy cover and height. It is dominated by *Pinus jeffreyi* and *Pinus monophylla*. *Pinus jeffreyi* averages 31 percent cover, while *Pinus monophylla* averages 38 percent cover. The shrub layer ranges between 15–25 percent and is dominated by *Artemisia tridentata*, with an average 10 percent cover. *Purshia tridentata* is also present in lower amounts. The herb layer averages 5 percent cover, with *Bromus tectorum* (exotic) and *Elymus elymoides* being the most frequent species.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K94, 99S100, 99K58

***Pinus jeffreyi*/Purshia tridentata Woodland**

COMMON NAME	Jeffrey Pine/Bitterbrush Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland
 ALLIANCE	 <i>Pinus jeffreyi</i> Woodland Alliance
 CLASSIFICATION CONFIDENCE LEVEL	
 USFWS WETLAND SYSTEM	 Upland

RANGE

Globally

This association has only described from Yosemite and environs and from the Indiana Summit Research Natural Area about eight miles southeast of the study area (Taylor, 1980).

Yosemite and environs

This association is occasional on the eastern slopes of the Sierra Nevada in Mono Basin including Horse Meadows, Log Cabin Mine Road, Parker Creek–June Lake area, and Lundy Canyon–Mill Creek area.

ENVIRONMENTAL DESCRIPTION

Globally

Taylor (1980) reports this association from the volcanic ash flows and welded volcanic tufa south of the Mono Craters. Soils are orthic humic Entisols. Most precipitation falls as snow, which reaches 1 meter deep and may persist on the ground for three months. Precipitation is estimated at being 12–16 inches per year. Several similar associations exist on the Modoc Plateau (Smith 1994).

Yosemite and environs

In Yosemite and environs, elevations range from 7,200–8,100 feet, and aspects are variable. This association is found in low to high slope positions, but all sites are considered uplands. Soils are rapidly drained to well drained sands and sandy loams derived primarily from igneous rock. Litter/Duff cover ranges from 5–95 percent.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs to date. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Purshia tridentata</i> , <i>Artemisia tridentata</i>
Herbaceous	<i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Artemisia tridentata</i> , <i>Purshia tridentata</i>

VEGETATION DESCRIPTION

Globally

This association is only described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Pinus jeffreyi, with 44 percent average cover, was the sole mature tree in sampled stands. The canopy is from 20–35 meters in height. *Pinus jeffreyi* saplings occur infrequently in the shrub layer. Shrub cover ranges from

10–20 percent with *Artemisia tridentata* averaging 8 percent and *Purshia tridentata* 5 percent cover. The herbaceous layer is sparse, varying from less than 1 to 10 percent cover. *Elymus elymoides* is the only frequent species in the herb layer and averages 4 percent cover. Other herb species include *Wyethia mollis*, *Cryptantha echinella*, *Eriogonum spergulinum*, *Leptodactylon pungens*, and the non-native *Bromus tectorum*. Total vegetation cover is 50–70 percent. Total species number about 50 in the four plots sampled locally.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION Depending on the definition this may be a common type on the east side of the Sierra Nevada from Modoc Plateau to the area around Walker Pass. However, many stands have been logged or grazed heavily in the past.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

The regular presence of *Artemisia tridentata* in these local stands suggests that they may be somewhat different than the associations defined by Taylor (1980) or Smith (1994), where *Purshia tridentata* appears to be the sole dominant understory shrub.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98M59, 98K47, 98M38, 99S56

Pinus jeffreyi/Cercocarpus ledifolius Woodland

COMMON NAME	Jeffrey Pine/Curleaff Mountain-Mahogany Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has only been described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is common in the eastern portion of Yosemite and environs.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of the association is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, elevations range from 7,500–8,700 feet, and aspects are variable. This association is found in low to high slope positions. Soils are moderately well- to well drained loamy sands and sandy loams derived primarily from granite. Litter/Duff cover ranges from 5–95 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs to date. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Cercocarpus ledifolius</i> , <i>Artemisia tridentata</i>
Herbaceous	<i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus jeffreyi</i>
Shrub	<i>Cercocarpus ledifolius</i>

VEGETATION DESCRIPTION

Globally

This association is only described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Pinus jeffreyi, with 36 percent average cover, was the sole mature tree in sampled stands. Trees range from 10–50 meters in height. *Abies concolor* and *Pinus albicaulis* saplings occur infrequently in the shrub layer. Shrub cover averages 24 percent, with *Cercocarpus ledifolius* averaging 16 percent cover. *Artemisia tridentata*, another frequent shrub, averages 5 percent cover. The herbaceous layer varies from 5–50 percent cover, with a 13 percent average cover. *Elymus elymoides* is the only frequent species in the herb layer and averages 1.5 percent cover. Other herb species include *Linanthus pachyphyllus*, *Poa secunda*, and *Wyethia mollis*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=6)

USGS–NPS Veg Data: 99K129, 99K76, 99K82, 99S80, 99S77, 99S85

Pinus jeffreyi - *Abies concolor*/*Symphoricarpos rotundifolius*/*Elymus elymoides* Woodland [Provisional]

COMMON NAME	Jeffrey Pine - White Fir/Roundleaf Snowberry/Bottlebrush Squirreltail Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus jeffreyi* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has only been described from the east side of Yosemite and environs. Information about its global characteristics is not available without additional inventory. A very similar vegetation type (if not identical) was described by Taylor (1980) at Indiana Summit Research Natural Area about 10 miles southeast of the southeastern-most portion of the study area (Mono County). He called it the *Abies concolor*/*Prunus emarginata* association.

Yosemite and environs

This association is uncommon in Yosemite and environs, where it occurs on the east side of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

Information about the global characteristics of the association is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, elevations range from 7,800–8,600 feet, and aspects and slopes are variable. This association is found primarily in low slope positions; one plot was on the edge of a lake. Soil drainage is variable, and texture is either loamy sand or sandy loam. Soils are derived from granite. Litter/Duff cover ranges from 60 to 90 percent. Sites are upland.

MOST ABUNDANT SPECIES

Globally

This association has only been described from Yosemite and environs to date. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus jeffreyi*, *Abies concolor*

CHARACTERISTIC SPECIES

Globally

This association is only known from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus jeffreyi*, *Abies concolor*
Shrub *Symphoricarpos rotundifolius*, *Artemisia tridentata*
Herbaceous *Elymus elymoides*

VEGETATION DESCRIPTION

Globally

This association is only described from Yosemite and environs. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

In Yosemite and environs, *Pinus jeffreyi*, with 27 percent average cover, is the dominant canopy tree. *Abies concolor* is not always present in the tree layer, in which it has an average 17 percent cover, but sometimes only occurs in the shrub layer. Trees range from 5–50 meters in height. *Symphoricarpos rotundifolius* and *Artemisia tridentata* are the most frequent shrub species, both with an average cover of less than 2 percent. *Elymus elymoides* is the only constant species in the herb layer but averages 0.5 percent cover. Other herbaceous species include *Lupinus argenteus*, *Arabis bodiensis*, *Bromus carinatus*, *Poa wheeleri*, *Poa secunda*, and *Poa pratensis*.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

RANK JUSTIFICATION The relatively mesic setting for this eastside association is probably uncommonly found, and where it occurs it is likely to have been logged or otherwise impacted by human disturbance.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Note: This type was called *Pinus jeffreyi* - *Abies concolor*/*Poa fendleriana* in the preliminary classification.

Plots used to describe association (n=3)

USGS–NPS Veg Data: 99K75, 99S75, 99S95

Pinus monophylla/*Cercocarpus ledifolius*/*Artemisia tridentata* - *Purshia tridentata* Woodland [Provisional]

COMMON NAME	Singleleaf Pinyon/Curleaf Mountain-Mahogany/Big Sagebrush - Bitterbrush Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus monophylla* (*Juniperus occidentalis*) Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found to the east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association grows on northeast to northwest aspects between 7,000–7,900 feet of elevation. Stands grow on moderate to steep lowslopes and midslopes. Soils are silty to loamy sands derived from igneous rocks. Aspects can be varied and do not seem to differentiate this type.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus monophylla*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus monophylla*

Shrub *Cercocarpus ledifolius*, *Artemisia tridentata*, *Purshia tridentata*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this vegetation form open canopies of *Pinus monophylla* between 5–10 meters in height, achieving approximately 25–35 percent cover. *Juniperus occidentalis* may co-occur at much lower cover values. *Cercocarpus ledifolius* occurs in scattered patches in the tree understory totaling only about 1.5 percent cover. The shrub layer is quite sparse with *Artemisia tridentata*, *Purshia tridentata*, and *Eriogonum umbellatum* each totaling about 1.5 percent cover. The herbaceous layer is very sparse with large patches of bare ground. The dominant life-forms in the ground layer are graminoids including *Achnatherum hymenoides*, *Achnatherum speciosum*, *Elymus elymoides*, and/or *Melica stricta* each attaining about 0.5 percent cover. The forb *Arabis platysperma* occurs regularly though it only achieves about 0.5 percent cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Pinus monophylla/*Artemisia tridentata* Woodland (CEGL000827) and *Pinus monophylla*/*Cercocarpus ledifolius* Woodland (CEGL000828) from the USNVC may be similar to this association. More study is needed.

Yosemite and environs

This association was combined with *Pinus monophylla*/*Cercocarpus ledifolius*/*Artemisia tridentata*/*Arabis platysperma* Woodland of the preliminary classification.

Plots used to describe association (n=4)

USGS–NPS Veg Data: 98K43, 99S68, 99S88, 99S89

Pinus monophylla/*Ribes velutinum* Woodland [Provisional]

COMMON NAME	Singleleaf Pinyon/Desert Gooseberry Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

ALLIANCE *Pinus monophylla* (*Juniperus occidentalis*) Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

This association is found in the montane regions east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association is found between 7,000–7,800 feet of elevation on northwest to southeast exposures. Stands prefer moderate to steep slopes on lower to upper slope positions. Soils are sandy to silty loams.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus monophylla</i>
Shrub	<i>Artemisia tridentata</i>
Herbaceous	<i>Elymus elymoides</i>

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree	<i>Pinus monophylla</i>
Shrub	<i>Ribes velutinum</i>

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association has an open canopy of *Pinus monophylla* averaging 26 percent cover 5–10 meters in height. *Cercocarpus ledifolius* (4% cover) often forms a sparse subcanopy. The shrub layer is sparse with *Artemisia tridentata* (8.7% cover), *Purshia tridentata* (5.8% cover), and/or *Eriogonum umbellatum* (0.3% cover). *Ribes velutinum* (1 % cover) is the diagnostic shrub species. The herbaceous layer is dominated by graminoids such as *Elymus elymoides* (1.2% cover), *Bromus tectorum* (exotic, 0.6% cover), *Melica stricta* (0.6% cover), *Achnatherum hymenoides* (0.4% cover), and/or *Achnatherum speciosum* (0.5% cover).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

This is closely related to the former *Pinus monophylla/Cercocarpus ledifolius/Artemisia tridentata – Purshia tridentata* description. However, the constancy of *Cercocarpus ledifolius* is not as high and the presence of *Ribes velutinum* is constant. With further analysis and more plots, there may be further adjustment to these association definitions.

Plots used to describe association (n=9)

USGS–NPS Veg Data: 98K44, 98M39, 98M45, 99K55, 99K56, 99K59, 99K61, 99K63, 99K87

Pinus monophylla/Artemisia tridentata/Elymus elymoides Woodland [Provisional]

COMMON NAME	Singleleaf Pinyon/Big Sagebrush/Bottlebrush Squirreltail Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural/Seminatural
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland
ALLIANCE	<i>Pinus monophylla (Juniperus occidentalis)</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	3
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found in the montane regions to the east of the Sierra Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association grows on south to southeast aspects between 7,500–7,600 feet of elevation. Stands grow on steep midslopes. Soils are loamy sands derived from metamorphic rocks.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus monophylla*
Shrub *Artemisia tridentata*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Tree *Pinus monophylla*
Shrub *Artemisia tridentata*, *Purshia tridentata*
Herbaceous *Elymus elymoides*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this vegetation form open canopies of *Pinus monophylla* between 5–15 meters in height, achieving approximately 37.5 percent cover. The shrub layer is quite sparse with *Artemisia tridentata* dominating with 2.5 percent cover. Other common associates include *Purshia tridentata*, *Ericameria nauseosa* ssp. *nauseosa*, *Tetradymia canescens*, and *Galium multiflorum*, each totaling about 0.25 percent cover. The herbaceous layer is very sparse with large patches of bare ground. Graminoids dominate the ground layer and, aside from the constant *Elymus elymoides*, may include *Achnatherum speciosum* and/or *Poa secunda*, each attaining about 0.5 percent cover.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK To be determined

RANK JUSTIFICATION

DATABASE CODE To be determined

COMMENTS

Globally

Pinus monophylla/*Artemisia tridentata* Woodland (CEGL000827) from the USNVC may be similar to this association. More study is needed.

Yosemite and environs

Plots used to describe association (n=2)

USGS–NPS Veg Data: 99S91, 99S92

Cercocarpus ledifolius/*Symphoricarpos rotundifolius* Woodland

COMMON NAME	Curleaf Mountain-Mahogany/Roundleaf Snowberry Woodland
SYNONYM	None
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Extremely xeromorphic evergreen woodland
PHYSIOGNOMIC SUBGROUP	Natural /Seminatural
FORMATION	Sclerophyllous extremely xeromorphic evergreen woodland

ALLIANCE *Cercocarpus ledifolius* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is only known from the vicinity of Yosemite. Information about its global range is not available without additional inventory.

Yosemite and environs

Stands of this association are found in scattered locations in the montane regions east of the Sierra Nevada Crest.

ENVIRONMENTAL DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Stands of this association are found between 7,600–9,300 feet of elevation on northwest to southwest aspects. Stands usually occur on midslopes though some occur on upper slopes and ridges. Slopes are moderate to steep, and soils are silty to sandy loams derived from igneous or metamorphic parent materials.

MOST ABUNDANT SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Cercocarpus ledifolius*

CHARACTERISTIC SPECIES

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

Shrub *Cercocarpus ledifolius*, *Symphoricarpos rotundifolius*

VEGETATION DESCRIPTION

Globally

This association is only known from the vicinity of Yosemite. Information about its global characteristics is not available without additional inventory.

Yosemite and environs

This association forms an intermittent canopy of *Cercocarpus ledifolius* (50% cover) between 2–5 meters in height. Occasional emergent individuals of *Juniperus occidentalis* (1.8% cover) may be present. *Artemisia tridentata* dominates the shrub layer with 4.5 percent cover. *Symphoricarpos rotundifolius* is the diagnostic shrub providing 1.3 percent cover in the shrub understory. *Eriogonum umbellatum* (0.13% cover), *Holodiscus discolor* (0.38% cover), *Chrysothamnus viscidiflorus* (0.13% cover), and *Leptodactylon pungens* (0.13% cover) may also be present. The herbaceous layer is quite sparse and dominated by graminoids. *Melica stricta* (0.4% cover), *Elymus elymoides* (0.8% cover), and/or *Achnatherum hymenoides* (0.19% cover) are usually present. A wide diversity of other graminoids and forbs may be present at very low cover values.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4?

RANK JUSTIFICATION May be relatively widespread up and down the east slope of the Sierra Nevada and also possibly in other parts of the Great Basin.

DATABASE CODE To be determined

COMMENTS

Globally

Yosemite and environs

Plots used to describe association (n=8)

USGS–NPS Veg Data: 99K65, 99K66, 99K69, 99K70, 99S90, 99S97, 99S99, 99S81

APPENDIXES

Appendix 1

Preliminary Vegetation Classification with Ecological Zones as of February 1998

**APPENDIX 1: PRELIMINARY VEGETATION CLASSIFICATION WITH ECOLOGICAL ZONES
AS OF FEBRUARY 1998**

Alliance/Association	Ecoregion
Herbaceous Types	
Tiling Monkeyflower Alliance (Taylor, 1984) (Includes 2 associations)	4
Claytonia nevadensis association (of above) (Taylor, 1984)	5
Minulus tilingii-Poa gracillima association (of above all) (Taylor, 1984)	4
Bolander's locoweed association (unknown alliance?)	3
Yellow pond lily Alliance (undifferentiated)	2
Agrostis gigantea alliance (int perennial grass in Sawyer and Keeler-Wolf) (undifferentiated)	2
***** Brewer's lupine (undescribed alliance?)	4
Creeping Ryegrass Alliance	8
***** Baltic rush association (or alliance??)	8
*****Iris-leaved rush-yarrow association (undefined meadow)	8
Brewer sedge Alliance (defined in Taylor, 1984) [2]	5
Brewer sedge association (Taylor, 1984)	5
Brewer sedge-Wheeler bluegrass association	5
California oat grass alliance [1]	4
California oat grass-pullup muhley association	4
***** Intermediate oat grass-Alpine pussytoes (undefined 1998 association data)	4
Shorthair reedgrass alliance (5 associations)	4
shorthair reedgrass-bilberry association (Taylor, 1984)	4
shorthair reedgrass-alpine aster	4
shorthair reedgrass-spike trisetum	4
shorthair reedgrass-drummond rush association (Taylor, 1984)	4
shorthair reedgrass-mountain laurel association (Taylor, 1984)	4
Shorthair sedge alliance (5 associations)	4
[Shorthair sedge-heretic penstemon (undescribed)]	4
Shorthair sedge-spike trisetum association	4
Shorthair sedge-Sierra ricegrass association	4
Shorthair sedge-saxifrage association (Taylor, 1984)	4
[shorthair sedge-Pussypaws association (Burke 1982)]	4
**** Sierra ricegrass stands	4
[One-spike oat grass (Danthonia unispicata) (alliance) [2 associations]	4
One-spike oat grass-King ricegrass-Coville ragwort association (Taylor, 1984)	4
[Alpine timothy - one-spike oat grass association (Taylor, 1984) < MMU]	4
[Rough bentgrass association (Halpern, 1986)] unknown alliance?	4
Kentucky bluegrass (alliance) [1]	2
[Kentucky bluegrass - many-nerved sedge association (undescribed)]	2
***** Mexican Rush Alliance (unknown association)	8
[One-sided bluegrass (alliance) (1)]	5
[Mount Dana sedge-little elephant's head association (Major & Taylor) alliance unknown?< MMU]	5
[Melica bulbosa (alliance) (1) < MMU]	4
[Lemmon Needlegrass-Mt. Shasta sedge association (Taylor, 1984) < MMU]	4
[White-tipped sedge-junegrass association (Author?) < MMU] Alliance?	5
Tufted hairgrass (alliance) [4]	4
[Tufted hairgrass-Brewer bittercress association (Benedict, 1983) not distinguishing from others]	4
[Tufted hairgrass-Coville ragwort association (Benedict, 1983)]	4
[Tufted hairgrass-Coville ragwort-yarrow association (Benedict, 1983)]	4
[Tufted hairgrass-northern goldenrod association (Taylor, 1984)]	4
Introduced Perennial Grassland alliance [no associations defined]	4
[Idaho fescue Alliance < MMU]	4
***** Blue wildrye Alliance? (some could also be Carex lanuginosa)	3
Blue wildrye-cow parsnip association (Halpern, 1986) unknown alliance?	3
Bluejoint reedgrass-small fruited bulrush association [unknown alliance?]	4
[Tall mannagrass Alliance (undefined, but see below 2 associations)	4
[Tall mannagrass - small-fruited bulrush association (Halpern, 1986) not distinguishing from next] alliance unknown	4
[Tall mannagrass-stream deer vetch association (Halpern, 1986)]	4

APPENDIX 1: continued

Alliance/Association	ecoregion
[Many-nerved sedge-yarrow association (Benedict, 1983)] unknown alliance?	4
Carex simulata alliance (undescribed)	4
*****Carex lenticularis lipocaria-Juncus nevadensis (eastside undefined)	7
Hood's sedge (unknown alliance?)	3
Inflated Sedge Alliance (undescribed)	3
Beaked sedge Alliance (2)	4
Beaked sedge association (Halpern, 1986) (=Taylor, 1984 Beaked sedge association?)	4
*****Weak mannagrass/Bolander's Quillwort association of above alliance (Taylor, 1984)	4
Nebraska sedge Alliance (2)	4
[Nebraska sedge association (Beguín & Major 1975)]	4
[Nebraska sedge-Sierra ricegrass association (Halpern, 1986)]	4
*****Meadow penstemon (P. rydbergii oreocharis) stands (undescribed)	4
Water Sedge Alliance (undescribed)	3
[Quillwort Alliance < MMU]	4
[Rocky Mountain sedge Alliance (4) indistinguishable]	4
[Rocky Mountain sedge association (Major & Taylor 1977)]	4
[Rocky Mountain sedge-elephant ears association (Taylor, 1984)]	4
[Rocky Mountain sedge-cottongrass association (Taylor, 1984)]	4
[Rocky Mountain sedge - few-flowered spikerush association (Taylor, 1984)]	4
[Spike rush alliance (2) < MMU]	4
[Mountain spikerush-moss association (Halpern, 1986) < MMU]	4
[Few-flowered spikerush association (Benedict, 1983) < MMU]	4
*****California annual herbland?? (mostly native annual herbs)	1
California annual grassland (alliance) (1)	1
Cheatgrass (alliance) (1)	8
[Cordilleran arnica (A. mollis) alliance (1) < MMU]	4
[Cordilleran arnica-Davidson arabis association (Taylor, 1984) < MMU]	4
Coville ragwort-showy sedge association (Burke 1982) alliance unknown?	4
Carpet clover association (Ratliff, 1982, 1985) unknown alliance?	3
Gentian-alpine aster association (Ratliff, 1982, 1985) (MMU?) unknown alliance?	4
Longstalk clover association (Ratliff, 1982, 1985) unknown alliance?	3
Bistort (Polygonum bistortoides) undescribed alliance	4
[Bulrush Alliance (> /=1) < MMU]	2
Bulrush-cattail (Scirpus spp.-Typha spp.) alliance [> /=1]	2
[Bur-reed (Sparganium spp.) alliance (> /=1) < MMU?]	4
[Cattail (Typha spp.) alliance (> /=1) < MMU]	1
Pondweeds with floating leaves (alliance) (> /=1)	4
[Blackish sedge alliance (3) < MMU]	4
[Mount Dana sedge-alpine shooting star association (Taylor, 1984) indiscernible]	4
[Blackish sedge-mountain laurel association (Taylor, 1984) < MMU]	4
[Vernacular sedge-alpine pussytoes association (Taylor, 1984)	
(=Alpine pussytoes-vernacular sedge association) (Major & Taylor) < MMU]	4
[Dewey sedge alliance (2) < MMU]	4
[Western yellow cress-Dewey sedge association (Taylor, 1984) < MMU]	4
[Merten rush association (Taylor, 1984)]	4
Corn lily alliance (2)	4
White corn-lily - arrowhead butterweed association (Taylor, 1984)	4
[Arrowhead butterweed-coville lupine (undescribed)]	4
[Arrowhead butterweed-showy sedge association (Taylor, 1984) < MMU]	4
(Canada goldenrod-yarrow (undescribed alliance?))	3
Lupinus latifolius seep type (undescribed alliance?)	3
[Luzulaleaf sedge (alliance) (1) < MMU]	4

[Luzulaleaf sedge - water-plantain buttercup association (Taylor, 1984) < MMU]	4
Shrub Types	
Arctic willow (alliance) (1)	5
Arctic willow association (Taylor, 1984)	5
Snow Willow (alliance undescribed)	5
Bilberry (alliance) (1)	5
APPENDIX 1: continued	
Alliance/Association	Ecoregion
[Bilberry-blackish sedge association (Major & Taylor) < MMU]	5
Big sagebrush (alliance) (1)	8
Big sagebrush-desert snowberry association (Taylor)	7
***** Birch-leaf Mountain Mahogany (Alliance)	1
Bitterbrush (alliance) (1)	8
Bitterbrush/cheatgrass (undescribed)	8
Bitter cherry (alliance)	3
Scotch Broom (alliance) (1)	1
Scotch broom association (undescribed)	1
Bush chinquapin (alliance) (1)	3
[Bush chinquapin association (undescribed)]	3
Chamise (alliance) (2)	1
Chamise association (undescribed)	1
Chamise-whiteleaf manzanita association (undescribed)	1
Chamise-wedgeleaf ceanothus (alliance) (1)	1
Chamise-wedgeleaf ceanothus association (Gordon & White)	1
Deerbrush (alliance) (1)	2
Deerbrush-mountain whitethorn association (undescribed)	2
Dusky willow (alliance) undefined	4
Gray-leafed Sierra willow/meadow onion (S. orestera) (alliance) (3)	4
Gray-leafed Sierra willow/meadow onion association (Taylor, 1984)	4
Gray-leafed Sierra willow/arrowhead butterweed association (Taylor, 1984 and Major & Taylor 1977)	4
Gray-leafed Sierra willow/shorthair reedgrass association (Taylor, 1984)	4
Greenleaf manzanita (alliance)	3
Holodiscus (alliance) (1)	4
[Rock-spiraea/Suksdorf monkeyflower association (Taylor, 1984) < MMU]	4
Huckleberry oak (alliance) (2)	3
Huckleberry oak-greenleaf manzanita association (Sawyer & Thornburgh)	3
Huckleberry oak-bush chinquapin	3
Interior live oak shrub (alliance) (2)	1
Interior live oak-California buckeye association (undescribed)	1
Interior live oak/poison oak association (undescribed)	1
***** Lemmon willow stands (Salix lemmonii)	4
Low sagebrush (alliance)	7
Mackenzie's Willow (undescribed alliance from Potter)	3
[Mountain alder (alliance) < MMU]	3
[Mountain heather-bilberry (alliance) (2) < MMU]	4
Mountain misery (undescribed alliance?)	2
Mountain Whitethorn alliance	
Narrow-leaf willow (alliance) **also includes higher elevation eastside stands	3
Rothrock sagebrush (alliance) (3)	7
[Rothrock sagebrush/heretic penstemon association (Benedict, 1983)]	6
[Rothrock sagebrush/pennyroyal association (Taylor, 1984)]	6
[Western Needlegrass-nude buckwheat association (Taylor, 1984) < MMU]	6
Rubber rabbitbrush (alliance)	4
Shrub cinquefoil (alliance) (2)	8
Shrub cinquefoil association (Burke 1982)	5
Shrub cinquefoil/one-spoke oat grass association (Taylor, 1984)	5
Sierra Willow (alliance) (Salix eastwoodiae)	5
***** Spiraea splendens (new undefined alliance??)	5
Tea-leafed willow (alliance) (2)	5
Tea-leafed willow-Rocky Mountain sedge association (Taylor, 1984)	5
Tobacco brush (alliance)	5

*****Western labrador Tea (alliance??)	7
Western Blueberry (alliance) undescribed (<i>V. uliginosum</i>)	4
Wedgeleaf ceanothus (alliance)	4
****Whitethorn (<i>Ceanothus leucodermis</i>) Alliance	1
Whiteleaf manzanita (alliance) (**includes <i>Arcto mewukka</i> and <i>A. vicida</i>)	1

APPENDIX 1: continued

Alliance/Association	Ecoregion
Tree Types	1
Arroyo willow (<i>Salix lasiolepis</i>) (alliance) (2)	
[Arroyo willow association (undescribed) < MMU]	2
Arroyo willow montane scrub type (undescribed from Potter data)	2
Aspen (alliance) (2)	4
Quaking aspen/California corn lily association (Potter, 1994)	4
Quaking aspen/mountain pennyroyal association (Potter, 1994)	4
Black cottonwood (alliance) (1)	4
Black cottonwood/western azalea (undescribed)	2
Black oak (alliance) (3)	2
Black oak/greenleaf manzanita association (Allen)	2
Black oak-Incense cedar (undefined)	2
Black oak association (Keeler-Wolf 1987f)	2
Blue oak (alliance) (6)	2
Blue oak-foothill pine/grass association (Allen et al., 1991)	1
Blue oak-foothill pine/wedgeleaf ceanothus-birch-leaf mountain mahogany association	1
Blue oak/grass association (Allen et al. 1991) (=Blue oak/common fiddleneck-rusty popcorn flower of Borchert?)	1
Blue oak-interior live oak/grass association (Allen et al., 1991)	1
Blue oak/wedgeleaf ceanothus/grass association (Allen et al., 1991)	1
Blue oak-valley oak/grass association (Allen et al., 1991)	1
California bay (alliance) (1)	1
California bay association (undescribed)	2
Canyon live oak (alliance) (3)	2
Canyon live oak/narrow-leaf fern association (Sawyer & Stillman 1977a)	2
Canyon live oak/whiteleaf manzanita association (undescribed)	2
Canyon live oak-California bay/keckiella association (undescribed)	2
Curleaf mountain-mahogany (alliance) (1)	
Curleaf mountain-mahogany association (undescribed)	7
Douglas-fir (alliance) (3)	7
Douglas-fir - white fir association (undescribed)	2
Douglas-fir - ponderosa pine - incense cedar association (Stuart et al., 1992)	2
Foothill pine (alliance) (2)	2
Foothill pine-interior live oak/wedgeleaf ceanothus association (undescribed)	1
Foothill pine-interior live oak/whiteleaf manzanita association (undescribed)	1
Fremont cottonwood (alliance)	1
Giant sequoia (alliance) (2)	8
Giant sequoia-sugar pine/hazel association (undescribed)	3
Giant sequoia-white fir/trail plant association (undescribed)	3
Interior live oak (alliance) (3)	3
Interior live oak-blue oak-foothill pine association (Allen et al., 1991)	1
Interior live oak-whiteleaf manzanita association (Allen et al., 1991)	1
Interior live oak-canyon live oak association (undescribed)	1
Jeffrey pine (alliance) (6)	1
Jeffrey pine/white fir association (undescribed)	3
Jeffrey pine/greenleaf manzanita association (Potter, 1994)	3
Jeffrey pine/mountain whitethorn association (Potter, 1994)	3
Jeffrey pine/bush chinquapin association (Talley, 1978)	3

Jeffrey pine/huckleberry oak association (Potter, 1994)	3
Jeffrey pine/antelope bitterbrush association (Taylor, 1980)	3
*****Jeffrey Pine/Aspen/Big sagebrush (undescribed eastside association)	7
Knobcone pine (alliance) (1)	7
Knobcone pine/whiteleaf manzanita association (undescribed)	1
Limber pine (alliance) (1)	1
Lodgepole pine (alliance) (10)	6
*****Lodgepole pine/Aspen/Poa pratensis (undescribed eastside type)	4
Lodgepole pine association (Potter, 1994)	7
Lodgepole pine-whitebark pine/Ross sedge association (undescribed)	4
Lodgepole pine/big sagebrush association (Potter, 1994)	4

APPENDIX 1: continued

Alliance/Association	Ecoregion
Lodgepole pine/gray lovage association (Potter, 1994)	4
Lodgepole pine/Fendler meadow-rue association (Taylor, 1984)	4
Lodgepole pine/mountain heather association (undescribed)	4
Lodgepole pine/open association (Potter, 1994)	4
Lodgepole pine/pussy paws association (Taylor, 1980)	4
Lodgepole pine/Ross sedge association (Taylor, 1984)	4
Lodgepole pine/shorthair sedge association (undescribed)	4
Mountain hemlock (alliance) (4)	4
Mountain hemlock association (Potter, 1994)	4
Mountain hemlock/broad-seeded rock cress association (=Potter 1994 Mountain hemlock/steep)	4
Mountain hemlock-western white pine association (undescribed)	4
[Mountain hemlock/heartleaf arnica association (Taylor, 1984)]	4
Mountain hemlock-lodgepole pine (alliance) (3)	4
Mountain hemlock-lodgepole pine/Ross sedge association (undescribed)	4
Mountain hemlock-lodgepole pine-whitebark pine association (undescribed)	4
Mountain hemlock-lodgepole pine/Mountain heather (undescribed)	4
Mountain hemlock-lodgepole pine-western white pine association (Parker 1988)	4
Mountain juniper (alliance) (3)	4
Mountain juniper association (Potter, 1994)	4
Mountain juniper/big sagebrush association (Potter, 1994)	4
Ponderosa pine (alliance) (4)	4
Ponderosa pine/mountain misery/Bolander's bedstraw association (Fites)	2
Ponderosa pine/whiteleaf manzanita association (undescribed)	2
Ponderosa pine-canyon live oak/Bolander's bedstraw association (=Fites' PIPO-MCN-QUCH2/GABO)	2
Ponderosa pine - incense cedar (alliance) (4)	2
Ponderosa pine - incense cedar - canyon live oak/mountain misery/multistemmed sedge association	2
Ponderosa pine - Incense cedar/mountain misery/Bolander's bedstraw association	2
Ponderosa pine - incense cedar - black oak association (undescribed)	2
Ponderosa pine - Incense cedar/blackcap raspberry association (undescribed)	2
Red fir (alliance) (15)	2
Red fir association (Potter, 1994)	3
Red fir-Jeffrey pine association (Potter, 1994)	3
Red fir/mule's ears association (Potter, 1994)	3
Red fir/pinemat manzanita association (Potter, 1994)	3
Red fir-western white pine-lodgepole pine association (Potter, 1994)	3
Red fir-lodgepole pine/whiteflowered hawkweed (Potter, 1994)	3
Red fir-western white pine association (Potter, 1994) - possible not distinguishing from previous	3
Red fir-western white pine/bush chinquapin association (Potter, 1994)	3
Red fir-western white pine/pinemat manzanita association (Potter, 1994)	3
Red fir-mountain hemlock association (undescribed)	3
Red fir-white fir (alliance) (Parker, 1984; Parker, 1982) (3)	3
[Red fir-white fir association (Potter, 1994)]	3
Red fir-white fir-Jeffrey pine (Potter, 1994)	3
White fir-sugar pine-red fir association (Potter, 1994)	3
Red willow (S. laevigata) (alliance) (1)	3
Singleleaf pinyon (alliance) (1)	1
Singleleaf pinyon/big sagebrush-bitterbrush/Indian ricegrass association (undescribed)	8
Singleleaf pinyon-Utah juniper (alliance) (1)	8

Singleleaf pinyon-Utah juniper/big sagebrush association (undescribed)	8
Valley oak (alliance) (1)	8
Valley oak association (undescribed)	1
Velvet Ash Alliance (undefined)	1
Western white pine (alliance) (2)	1
Western white pine/western Needlegrass association (undescribed)	4
Western white pine-lodgepole pine association (undescribed)	4
White alder (alliance) (2)	4
White alder-cornus nuttallii (undescribed)	2
[White alder/Indian rhubarb association (Taylor) < MMU]	2

APPENDIX 1: continued

Alliance/Association	Ecoregion
White fir (alliance) (3)	2
White fir-Sugar pine-Jeffrey Pine (undescribed new)	3
[White fir-Pacific dogwood/trail plant association. Similar to PSME-MCN-CONU/ADBI (Fites)]	3
[White fir/false Solomon's seal-Hooker fairybells association (Fites)]	3
White fir/mountain whitethorn association (undescribed)	3
White fir - incense cedar - sugar pine (alliance) (3)	3
[White fir - incense cedar - sugar pine/trail plant association (=Fites' ABCO-MCN/ADBI)]	3
White fir - incense cedar - sugar pine/creeping snowberry/kelloggii association (=Fites' ABCO-MCN/SYMO/KEGA)	3
White fir - incense cedar - sugar pine/bush chinquapin/multistemmed sedge association (=Fites' ABCO-MCN/CHSE2)	3
Whitebark pine (alliance) (4)	3
Whitebark pine/Wheeler bluegrass association (Taylor, 1984)	4
[Whitebark pine/Davidson penstemon association (Taylor, 1984)- possible not distinguishing from	4
[Whitebark pine/Ross sedge association (undescribed)- possible not distinguishing from PIAL/POWH]	4
Whitebark pine/shorthair sedge association (undescribed)	4
Habitats (all alpine-subalpine)	4
Congdon sedge-streambank arnica (alliance) (2) (Taylor, 1984)	
[Streambank arnica - Congdon sedge association (Taylor, 1984) < MMU]	5
Red elderberry - Congdon sedge association (Taylor, 1984)	5
Purple reedgrass (alliance) (1) (Taylor, 1984)	5
[Purple reedgrass-granite gilia association (Taylor, 1984)]	5
*****Single-headed rabbitbush-granite gilia association (Taylor, 1984)	5
Nuttall sandwort-alpine goldenbush (alliance) (1) (Taylor, 1984)	5
[Nuttall sandwort association (Taylor, 1984)]	5
***** King's sandwort (Arenaria kingii compacta)-Western Needlegrass (undescribed assn)	5
Alpine hulsea (alliance) (1) (Taylor, 1984)	5
[Alpine goldenbush (Ericameria)-timberline phacelia association (Taylor, 1984)]	5
Nested saxifrage-Suksdorf monkeyflower (Saxifraga nidifica-Mimulus rubellus) (alliance) (4) (Taylor, 1984)	5
[Nested saxifrage-Suksdorf monkeyflower association (Taylor, 1984) < MMU]	5
[Moss saxifrage association (Taylor, 1984) < MMU]	5
[Alpine smartweed association (Taylor, 1984) < MMU]	5
[Alpine sedum-Watson spikemoss association (Taylor, 1984) < MMU]	5
Heller sedge (alliance) (4) (Taylor, 1984)	5
[Heller sedge-club-moss ivesia association (Taylor) < MMU]	5
[Alpine saxifrage-woodrush association (Taylor, 1984) < MMU]	5
[Vagus buckwheat-silky raillardella association of above alliance (Taylor, 1984)]	5
[Heller sedge-Parry rush association (Major & Taylor) < MMU]	5
Parry rush (alliance) (3) (Taylor, 1984)	5
Parry rush-vagus buckwheat association (Taylor, 1984)	5
Mountain heather association (Taylor, 1984)	5
Showy sedge-sibbaldia association (Taylor, 1984) (< MMU?)	5
Black and white-scaled sedge-alpine sedum association (undescribed)	5
Mountain pride-jewelflower (alliance) (2) (Taylor, 1984)	5

[Mountain spiraea association (Taylor, 1984) < MMU] of above alliance	4
[Sierra stonecrop (=mountain sedum)-mountain muhly association (Taylor, 1984) < MMU, occurs in linear segments along bedrock fractures]	4
Fragile fern (alliance) (1) (Taylor, 1984)	4
[Alpine alumroot-fragile fern association (Taylor, 1984)]	5
Alpine sorrel (alliance) (1) (Taylor, 1984)	5
[Lemmon draba-alpine sorrel association (Taylor, 1984) very sparse, small statured	5
Squirreltail-Coville phlox (alliance) (4) (Taylor, 1984)	5
[Muir ivesia association (Taylor, 1984) very sparse, small statured plants]	5
[Podistera-pygmy daisy association (Taylor, 1984) < MMU of above alliance]	5
[Showy fescue-Davidson penstemon association (Taylor, 1984) very sparse, small statured plants]	5
[Coville phlox-vagus buckwheat association (Taylor, 1984) (mappable size but very sparse, small-statured plants]	5
[Dense draba-Sweetwater mountain milkvetch association (Taylor, 1984) very sparse, small-statured plants]	5

Appendix 2

Natural Resource Inventory Protocol and Metadata

APPENDIX 2: NATURAL RESOURCE INVENTORY PLOT DATA PROTOCOL

Vegetation Inventory and Type Mapping Project Yosemite National Park

Protocol for Field Plot Data Files

File Name: VEGIN\DOC\PLOTDATA.PRO

Last Update: 5/30/95

Subdirectories entitled \FUEL PLOT and \VEG PLOTS have been established for dBASE IV files containing fuel and vegetation (Thematic Mapper [TM] classification ground verification) field plot data.

Databases associated with vegetation plots and their correlates for fuel inventory plots are

Vegetation Plots	Fuel Plots	Page
BURGAN.DBF.....	FBURGAN.DBF.....	9
DEADDBH.DBF.....		14
DOMCOVHT.DBF.....	FDOMHT.DBF.....	11
FUELDIAM.DBF.....	FDIAM.DBF.....	8
FUEL T1.DBF.....	FT1.DBF.....	6
FT10.DBF.....		7
FT100.DBF.....		7
HERBCOV.DBF.....	FHERBCOV.DBF.....	5
LITTDPTH.DBF.....	FLITTDPT.DBF.....	7
OBSVRS.DBF.....		17
PLOTAMPH.DBF.....		15
PLOTBIRD.DBF.....		16
PLOTMAM.DBF.....		16
PLOTREP.DBF.....		17
SAPLINGC.DBF.....		14
SHRUBCOV.DBF.....	FSHRBCOV.DBF.....	6
SOIL.DBF.....		19
SUBCOVHT.DBF.....	FSUBHT.DBF.....	11
TOPO.DBF.....		17
TREECNT.DBF.....	FTREECNT.DBF.....	10
TREEDBH.DBF.....	FTREEDBH.DBF.....	13
TREEHTS.DBF.....	FTREEHTS.DBF and POLECALC.DBF.....	13
TREESDLG.DBF.....	FTRSDLG.....	15
SAPLINGC.DBF.....		14
VEGPLOT.DBF.....	FUEL PLOT.DBF.....	2
VEGSP.DBF.....	FUELSP.DBF.....	18
PLOTTYPE.DBF.....	FPLTTYPE.DBF.....	4
XFLORA.DBF.....	FXFLORA.DBF.....	19
SOIL.DBF.....		19
PLOTNOS.DBF.....		20

The field < PLOTNO > is common to all of the files so that it can be used to link observations from any database for a given plot. In the case of vegetation plots, it consists of the TM classification category number (1–156), the elevation zone (2–13), and the plot number (1–4). In the case of fuel plots, plot numbers are consecutive ending with F for initial plots and BF for replacement plots.

The field < CODE> is used in HERBCOV.DBF, POLECALC.DBF, SHRUBCOV.DBF, TREECNT.DBF, TREEDBH.DBF, TREEHTS.DBF, VEGSP.DBF, corresponding fuel plot files, and wildlife observation files in which:

- 4-letter/2-digit codes from FLORA.DBF represent plant species
- 4-letter codes from FAUNA.DBF represent wildlife species

The field < CODE> is also used in XFLORA.DBF and FXFORA.DBF to represent unidentified plant species. The code consists of the plot number plus the number assigned to the unidentified plant on the plot.

Data should be entered into files in the order they appear on data sheets to ease accuracy checks and visual searches.

Each database is listed below along with its fields, field characteristics and definitions, and notes regarding acceptable values.

VEGPLOT.DBF/FUELLOT.DBF

This file contains general and descriptive information for individual field plots.

Field	Type	Width	Comments
PLOTNO	Character	9/5	Arbitrarily assigned consecutive numbers.
PLOTMARKER	Logical	1	Signifies whether a marker was left on the plot. Leave empty if missing
DOMSP1	Character	6	
DOMSP2	Character	6	DOMSP1 and DOMSP2 indicate the dominant species of 1 or 2 overstories in codes from FLORA.DBF.
DEVSTAGE	Character	1	<p>*For fuel plots only, note the developmental stage of dominant overstory tree species.</p> <p>S = Sapling; 0–15 cm diameter (0–6 inches) P = Pole; 15–61 cm diameter (6–24 inches) M = Mature; 61–122 cm diameter (24–48 inches) O = Old; 122+ cm diameter (48+ inches) Leave empty if missing</p>
DATE	Date	8	Date of data collection
MULTIAGE	Logical	1	*For fuel plots only , indicates whether stand consists of multiple aged trees. Leave empty if missing.
PHOTOROLL	Numeric	2	Film roll number on which plot photographs are taken
PHOTOEXP	Character	15	Plot photograph exposure numbers divided by slashes (e.g., 24/25/26/27)
AER_PHOTO	Numeric	4	Number of aerial photograph that includes plot location (9999 = Missing data)
QUAD	Character	6	Topographic quadrangle (7.5- or 15-minute series) on which plot is located. Where both are referred to, the 7.5-minute series name will be recorded. Six-character codes are listed in TOPO.DBF.
UTME	Numeric	6	Plot location in Universal Transverse Mercator coordinates to the nearest 0.1 kilometer (from map) or 0.001 kilometer (from global positioning device)
UTMN	Numeric	7	Plot location in Universal Transverse Mercator coordinates to the nearest 0.1 kilometer (from map) or 0.001 kilometer (from global positioning device)

Field	Type	Width	Comments
DECL	Numeric	4.1	Compass declination used in locating plot. 1989 decl. = 18.0 99.9 = Missing June 1990 decl. = 18.0 After July 1, 1990 plots in 1990 decl. = 16.5; 1991–1993 decl. = 16.5
ELEV	Numeric	5	Elevation recorded in feet. A field for elevation in meters will be constructed after data entry
ASPECT	Numeric	3	Recorded in degrees; 0 = flat
SLOPE	Numeric	2	Recorded in degrees; 0 = flat
FUEL PLOT	Logical	1	Indicates whether or not plot was established primarily for fuel accumulation study
TEAM	Character	30	List of personnel on plot recorded in four-letter codes (see OBSVRS.DBF) with codes divided by slashes
LOCATION	Character	30	Brief description of plot location
DESCR	Memo	10	Plot description including dominant species, topography, unique features, and relocation notes
FIRE	Character	20	Brief description of fire evidence in 17.8-meter radius plot. Rx can be used to refer to prescribed burns
DISTURB	Character	40	Brief description of disturbance on plot
H2O	Numeric	2	Amount of 17.8-meter radius plot cover by water, recorded in square meters; 999 = Missing
H2O TYPE	Numeric	1	1 = Standing water; 2 = Flowing water; 0 = None; 9 = Missing
ROCK CLASS	Numeric	1	Amount of 17.8-meter radius plot covered by rock recorded in cover classes; 9 = Missing
ROCK AREA	Numeric	3	Amount of 17.8-meter radius plot covered by rock, recorded in percent; 999 = Missing; used after 1990
LOC_CERT	Numeric	3	Estimate of location accuracy in relation to target UTM recorded in meters
RELOC	Character	1	Relocatability described as 1 = Good, 2 = Fair, or 3 = Poor

Field	Type	Width	Comments
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Total: 32 fields

PLOTTYPE.DBF/FPLTTYPE.DBF

This file contains vegetation types occurring within 100 meters of plot center.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number; category/elevzone/plot 1–4 for vegetation plots; 1–3-digit consecutive plot numbers followed by F for fuel plots and BF for replacement fuel plots
TYPECODE	Character	5	Vegetation type code present less than 100 meters from plot center (see VEGTYPES.DBF for codes); 99999 = Missing.

Total: 2 fields

HERBCOV.DBF/FHERBCOV.DBF

This file contains data on cover by herbaceous species or other material within meter square quadrats.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number; category/elevzone/plot 1–4 for vegetation plots; 1–3-digit consecutive plot numbers followed by F for fuel plots and BF for replacement fuel plots
QUAD	Numeric	1	1 = North transect, quadrat at 1 meter; 2 = North transect, quadrat at 5 meters; 3 = North transect, quadrat at 15 meters; 4 = East transect, quadrat at 1 meter; 5 = East transect, quadrat at 5 meters; 6 = East transect, quadrat at 15 meters.
CODE	Character	6	Code from FLORA.DBF for plant <i>species</i> or one of the following alternate codes: BARE, LICHEN, LITTER, MOSS, ROAD, ROCK, SNOW, STRUC, TRAIL (structure), WATER, WOOD (dead and down)

Note: Tree species codes ending with 18 indicate seedling beginning with plot number 314.

COVERCLASS	Numeric	1	Area covered by species or material in CODE recorded in classes
			<div>1 = 0–5%</div> <div>2 = 6–25%</div> <div>3 = 26–50%</div> <div>4 = 51–75%</div> <div>5 = 76–95%</div> <div>6 = 96–100%</div> <div>9 = Missing data</div>
COVER	Numeric	3	Cover of the species or material indicated in CODE estimated in percent; 999 = Missing data

Total: 5 fields

SHRUBCOV.DBF/FSHRBCOV.DBF

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number; category/elevzone/plot 1–4 for vegetation plots; 1–3-digit plot numbers followed by F for fuel plots and BF for replacement fuel plots
TRANSECT	Numeric	1	Indicates which of 2 transects on plot; 1 = North; 2 = East
CODE	Character	6	Code from FLORA.DBF for <u>species</u> or one of the following codes: BARE, LICHEN, LITTER, MOSS, ROAD, ROCK, SNOW, STRUC (structure), TRAIL, WATER, WOOD (dead and down)
COVER	Numeric	4	Transect intercept of the species or category recorded in centimeters; 9999 indicates missing data.

Total: 4 fields

FUELT1.DBF/FT1.DBF

Make two records for every plot (1 per transect). FT1.DBF records contain data on one-hour fuels only.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as above
TRANSECT	Numeric	1	1 = North; 2 = East
SLOPE	Numeric	2	Slope steepness along transect recorded in degrees; 99 = Missing
TALLY1HR	Numeric	3	The number of one-hour fuels (0.0–0.6 centimeter diameter) intercepting the transect between 0 and 2 meters; 0 = none; 999 = Missing
TALLY10HR	Numeric	2	The number of 10-hour fuels (0.6–2.5 centimeter diameter) intercepting the transect between 0 and 2 meters; 0 = none; 999 = Missing
TALLY100HR	Numeric	2	The number of 100-hour fuels (2.5–7.6 centimeter diameter) intercepting the transect between 0 and 4 meters; 0 = none; 999 = Missing

Total: 6 fields

FT10.DBF

*Data entered for fuel plots only. Record created only when 10-hour fuels occurred on either transect.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as above
TRANSECT	Numeric	1	1 = North; 2 = East
TALLY10HR	Numeric	2	The number of 10-hour fuels (0.6–2.5 centimeter diameter) intercepting the transect between 0 and 2 meters

Total: 3 fields

FT100.DBF

*Data entered for fuel plots only. Record created only when 10-hour fuels occurred on either transect.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as above
TRANSECT	Numeric	1	1 = North; 2 = East
TALLY10HR	Numeric	2	The number of 100-hour fuels (2.5–7.6 centimeter diameter) intercepting the transect between 0 and 4 meters

Total: 3 fields

LITTDPTH.DBF/FLITTDPT.DBF

This field contains depth measurements of litter and duff at 0.5 and 1.5 meters on each transect. Create a record for each plot showing depth to the nearest 0.1 centimeter or 0 if no litter is present.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as above
LIT1	Numeric	4.1	Depth of current year's litter (to closest 0.1 centimeter) on North transect at 0.5 meter
DUFF1	Numeric	4.1	Depth of entire duff layer above mineral soil on North transect at 0.5 meter
LIT2	Numeric	4.1	North transect at 1.5 meters
DUFF2	Numeric	4.1	North transect at 1.5 meters
LIT3	Numeric	4.1	East transect at 0.5 meter
DUFF3	Numeric	4.1	East transect at 0.5 meter

LIT4	Numeric	4.1	East transect at 1.5 meter
DUFF4	Numeric	4.1	East transect at 1.5 meters

Total: 9 fields

FUELDIAM.DBF/FDIAM.DBF

This field contains diameters of sound or rotten 1,000-hour time lag fuels (> 7.6 diameter) that intercept shrub transects.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as above
TRANSECT	Numeric	1	1 = North; 2 = East
SND_ROT	Numeric	1	1 = Sound; 2 = Rotten
DIAM	Numeric	3	Diameter of logs intercepting transects recorded in centimeters; 0 if none; 999 = Missing

Total: 4 fields

BURGAN.DBF/FBURGAN.DBF

This field contains ocular estimates of herbaceous, shrub, and litter fuels following the methods of Burgan and Rothermel (1984).

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
GRSTYP	Numeric	1	Grass type: 1–4; 0 = N/A; 9 = Missing
GRSCLS	Numeric	1	Grass class: 1–6; 0 = N/A; 9 = Missing
GRSDPTH	Numeric	3	Depth of herbaceous fuels recorded in centimeters; 0 = N/A; 999 = Missing
MAXLIV	Numeric	3	Percent of herbaceous material alive at any time during the year, regardless of green component when data recorded; 0 = N/A; 999 = Missing
CURLIV	Numeric	3	Percent of herbaceous material currently alive at time of data collection; 0 = N/A; 999 = Missing
SHRBTP	Numeric	1	Shrub type: 1 – 5; 0 = N/A; 9 = Missing
SHRBCLS	Numeric	1	Shrub class: 1 – 6; 0 = N/A; 9 = Missing
SHRBDPTH	Numeric	3	Height of shrubs recorded in centimeters; 0 = N/A; 9 = Missing
SHRB1HR_D	Numeric	3	Percent of standing shrub biomass in 1-hour size class that is dead; 0 = N/A; 999 = Missing
SHRB10HR_D	Numeric	3	Percent of standing shrub biomass in 10-hour size class that is dead; 0 = N/A; 999 = Missing

Field	Type	Width	Comments
SHRB100HR_D	Numeric	3	Percent of standing shrub biomass in 100-hour size class that is dead; 0 = N/A; 999 = Missing
SHRB1HR_L	Numeric	3	Percent of standing shrub biomass in 1-hour size class that is live; 0 = N/A; 999 = Missing
WAX	Logical	1	Indicates whether shrub leaves are sclerophyllous and/or volatile oils are present (enter T) or neither is true (enter F)
LITSRC	Numeric	1	Indicates source of litter: 0 = Neither 1 = Conifers 2 = Hardwoods 3 = Both conifers and hardwoods contribute at least 30 percent each 9 = Missing
NDLNGTH	Numeric	1	Length of conifer needles if present: 0 = no conifers 1 = Medium/Long (e.g., PICO, PIPO) 2 = Short (e.g., ABCO, PSME, TSME) 9 = Missing
COMPACT	Numeric	1	Litter compactness: 0 = No litter 1 = Loose (fresh) 2 = Normal 3 = Compact (old) 9 = Missing
LIT1HR	Numeric	3	Percent of litter in each size class; total = 100 percent, estimated to nearest 1 percent 999 = Missing
LIT10HR	Numeric	3	Percent of litter in each size class; total = 100 percent, estimated to nearest 1 percent 999 = Missing
LIT100HR	Numeric	3	Percent of litter in each size class; total = 100 percent, estimated to nearest 1 percent 999 = Missing

Total: 19 fields

TREECNT.DBF/FTREECNT

This field contains tree tallies by species, live or dead status, and size class.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	6	Tree species code from FLORA.DBF
STATUS	Numeric	1	1 = Live; 2 = Dead; assume only live trees counted on fuel plots before 1988
TALLY1	Numeric	3	The number of trees in the plot 1–3 meters in height

TALLY2	Numeric	3	The number of tree in the plot 3–10 meters in height
TALLY3	Numeric	3	The number of trees in the plot > 10 meters in height

Total: 6 fields

DOMCOVHT.DBF/FDOMHT.DBF

Contains data on the dominant cover layer

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
RADIUS	Numeric	5.2	Plot radius determined by prism method (m)
BAF	Numeric	2	Basal Area Factor
DOMHT	Numeric	5.1	Height of the highest dominant vegetation layer, recorded to the nearest 0.5 meter
COVCLASS	Numeric	1	Cover class (1–6) of the highest vegetative layer; leave blank if COVER entered
COVER	Numeric	3	Cover of the highest vegetative layer, recorded to the nearest 1 percent. Leave blank if COVCLASS entered.

Total: 6 fields

SUBCOVHT.DBF/FSUBHT.DBF

This field contains data only if there is a second canopy height estimate.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
DOMHT2	Numeric	5.1	Height of the second highest vegetative layer, recorded to the nearest 0.5 meter
COVCLASS2	Numeric	1	Cover class (1–6) of the second highest vegetative layer. Leave blank if COVER2 entered
COVER2	Numeric	3	Cover of the second highest vegetative layer, recorded to the nearest 1 percent. Leave blank if COVCLASS2 entered.

Total: 4 fields

Fuelplot\POLECALC.DBF

This field is to be used for plots where tree height estimates were made using a four-meter long pole and the tangent method of Curtis and Bruce (1968). If no tree height data were taken for individual trees or entire plots, enter dbhs into TREEDBH.DBF for vegetation plots or FTREEDBH.DBF for fuel plots. Note: dbh and prisms were metric after September 15, 1987.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	6	Tree species code from FLORA.DBF
DBH	Numeric	3	Diameter at breast height

Field	Type	Width	Comments
TREETOP	Numeric	3	Angle to treetop recorded in degrees
POLETOP	Numeric	6.1	Angle to top of pole recorded in degrees
POLEBASE	Numeric	5.1	Angle to base of pole recorded in degrees
CRNBOT	Numeric	5.1	Angle to tree crown base recorded in degrees
POLERISE	Numeric	3	Height of base of pole raised above base of tree in centimeters
CRNMAX	Numeric	4.1	Maximum tree crown diameter to nearest 0.5 meter
CRNMIN	Numeric	4.1	Minimum tree crown diameter to nearest 0.5 meter
MSD_TR_HT	Numeric	2	Height of tree if measured directly. Calculated fields to be formed after data entry
DIST	Numeric	3	Calculated in query 1 using a pole height of 4 meters and the fields POLETOP and POLEBASE
TREEHT	Numeric	3	Calculated in query using the fields DIST, TREETOP, POLEBASE, and POLERISE

Total: 11 fields entered, 13 fields total

TREEHTS.DBF/FTREEHTS.DBF

This field contains data on tree heights collected without use of the 4-meter pole.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	6	Tree species code from FLORA.DBF
DBH	Numeric	3	Diameter at breast height
DIST	Numeric	3	Distance from tree base in meters
TREETOP	Numeric	2	Angle to tree top recorded in degrees
TREEBASE	Numeric	5.1	Angle to tree base recorded in degrees
CRNBOT	Numeric	5.1	Angle to tree crown base recorded in degrees

Field	Type	Width	Comments
MSD_TR_HT	Numeric	2	Height of tree if measured directly or calculated in the field from distance and percent slope to treetop. Leave blank otherwise.
CRNMAX	Numeric	4.1	Maximum tree crown diameter to nearest 0.5 meter
CRNMIN	Numeric	4.1	Minimum tree crown diameter to nearest 0.5 meter

Total: 9 fields

TREEDBH.DBF/FTREEDBH.DBF

Note: This field is to be used only when tree height data were **not** collected; when tree height data were taken, enter dbh in POLECALC.DBF or FTREEHTS.DBF for fuel plots or TREEHTS.DBF for vegetation plots.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	6	Tree species code from FLORA.DBF
DBH	Numeric	3	Diameter at breast height (centimeters); began metric dbh measures on 9/15/87 on plot 48.
HT_CLS	Numeric	1	Height class of tree recorded as: 1 = 0–3 meters; 2 = 3–10 meters; 3 = > 10 meters; 9=missing

Total: 3 fields

DEADDBH.DBF

Note: This field is to be used only when tree height data were **not** collected. Contains data on diameter at breast height for dead tree species within 17.84 m of plot center.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	6	Tree species code from FLORA.DBF
DBH	Numeric	3	Diameter at breast height (centimeters)

Total: 3 fields

SAPLINGC.DBF

Note: This field is used for vegetation inventory plots beginning in 1991. Contains stem counts by species for sapling trees under 1.37 meters.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	6	Tree species code from FLORA.DBF

TALLY	Numeric	3	Count of live sapling stems within 17.84 meters of plot center.
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Total: 3 fields

TREESDLG.DBF/FTRSDLG.DBF

This field contains percent cover of tree seedlings by species estimated in quadrats.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
QUAD	Numeric	1	1 = North transect, quadrat at 1 meter 2 = North transect, quadrat at 5 meters 3 = North transect, quadrat at 15 meters 4 = East transect, quadrat at 1 meter 5 = East transect, quadrat at 5 meters 6 = East transect, quadrat at 15 meters
CODE	Character	6	Tree species code from FLORA.DBF
COVERCLASS	Numeric	1	Area covered by species in CODE recorded in classes: 1 = 0–5% 2 = 6–25% 3 = 26–50% 4 = 51–75% 5 = 76–95% 6 = 96–100% 9 = Missing data
COVER	Numeric	3	Cover of species indicated in CODE estimated in percent; 999 = Missing data

Total: 5 fields

PLOTAMPH.DBF

This field contains amphibian observations recorded on fuel and vegetation plots.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	4	Species code from FAUNA.DBF
STATUS	Numeric	1	1 = No evidence of breeding 2 = Evidence of breeding (young, nest) 3 = Identified from sign 9 = Missing data
OBSERVER	Character	4	4-letter identifying code; XXXX = Missing

Total: 4 fields

PLOTBIRD.DBF

This field contains bird observations recorded on fuel and vegetation plots.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	4	Species code from FAUNA.DBF
STATUS	Numeric	1	1 = No evidence of breeding 2 = Evidence of breeding (young, nest) 3 = Identified from sign or call 9 = Missing data
OBSERVER	Character	4	4-letter identifying code; XXXX = Missing

Total: 4 fields

PLOTMAM.DBF

This field contains mammal observations recorded on fuel and vegetation plots.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	4	Species code from FAUNA.DBF
STATUS	Numeric	1	1 = No evidence of breeding 2 = Evidence of breeding (young, nest) 3 = Identified from sign or call 9 = Missing data
OBSERVER	Character	4	4-letter identifying code; XXXX = Missing

Total: 4 fields

PLOTREP.DBF

This field contains reptile observations recorded on fuel and vegetation plots.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	4	Species code from FAUNA.DBF
STATUS	Numeric	1	1 = No evidence of breeding 2 = Evidence of breeding (young, nest) 3 = Identified from sign or call 9 = Missing data
OBSERVER	Character	4	4-letter identifying code; XXXX = Missing

Total: 4 fields

TOPO.DBF

This field contains six-character codes for all USGS topographic quadrangles in Yosemite.

Field	Type	Width	Comments
QUAD	Character	6	6-character code for USGS topographic quadrangle using -first 4 letters of single-word map names -first 2 letters of each word for 2-word map names -for 3-word map names, first letter of first 2 words and 2 letters from third word
MAPNAME	Character	25	Full map name
PUB_DATE	Character	4	Year map was published

Total: 3 fields

OBSVRS.DBF

This field contains four-letter codes for personnel involved with field data collection.

Field	Type	Width	Comments
INIT	Character	4	First 2 letters from first and from last name
NAME	Character	30	Full name of observer
YEAR	Character	19	Year or years individual has been involved with field data collection

Total: 3 fields

VEGSP.DBF/FUELSP.DBF

This field contains full plant species list for each fuel or vegetation plot compiled from HERBCOV.DBF, SHRUBCOV.DBF, TREECNT.DBF, and other species listed as present on the plot.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	11	Plot number and number of unidentified plant on plot
COVERCLASS	Numeric	1	Area covered by species in CODE, recorded in classes

1 = 0–5% 2 = 6–25% 3 = 26–50%
4 = 51–75% 5 = 76–95% 6 = 96–100%
9 = Missing data

COVER	Numeric	3	Cover of the species estimated in percent; 999 indicates missing data
STATUS	Numeric	1	1 = Herbaceous on quadrat 2 = Shrub on transect 3 = Tree in tally or basal area estimate 4 = Occurred on plot but no cover estimated

Total: 5 fields

XFLORA.DBF/FXFLORA.DBF

This field contains codes from unidentified plants (not identified at least to species) by plot number.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above
CODE	Character	11	Plot number and number of unidentified plant on plot
COVERCLASS	Numeric	1	Area covered by species in CODE, recorded in classes: 1 = 0–5% 2 = 6–25% 3 = 26–50% 4 = 51–75% 5 = 76–95% 6 = 96–100% 9 = Missing data
COVER	Numeric	3	Cover of the species estimated in percent; 999 indicates missing data
STATUS	Numeric	1	1 = Herbaceous on quadrat 2 = Shrub on transect 3 = Tree in tally or basal area estimate 4 = Occurred on plot but no cover estimated
COLLECTED	Logical	1	Whether plant was collected for lab determination
DET	Character	20	Taxonomic determination thus far (e.g., family, tribe, genus)

Total: 7 fields

SOIL.DBF

This field contains information on soil depth and soil samples collected from vegetation inventory plots by plot number.

Field	Type	Width	Comments
PLOTNO	Character	9	Plot number as noted above

DEPTH1	Numeric	2	Depth of uppermost horizon; in deepest horizon, depth should be considered a minimum estimate as probe length = ~25 centimeters; 99 = Missing horizon depth
DEPTH2	Numeric	2	Depth (centimeters) of second horizon from soil surface
DEPTH3	Numeric	2	Depth (centimeters) of third horizon from soil surface
DEPTH4	Numeric	2	Depth (centimeters) of fourth horizon from soil surface
DEPTH5	Numeric	2	Depth (centimeters) of fifth horizon from soil surface
MEAN_DEPTH	Numeric	4	Mean depth (centimeters) of soil calculated from 10 randomly placed probes in 0.1 ha site
COMMENTS	Character	100	Comments on soil or soil sampling

Total: 8 fields

PLOTNOS

This field contains vegetation inventory plots only.

PLOTNO	Numeric	9	Arbitrarily assigned consecutive numbers (or pseudonumbers)
CATEG	Character	3	These 3 fields can be concatenated
ELE	Character	2	Using a query to produce the field PLOTID when a combination of category, elevation, and plot number is needed
PLOTNUM	Character	1	Using a query to produce the field PLOTID when a combination of category, elevation, and plot number is needed

Total: 4 fields

References:

Curtis, R.O., and D. Bruce. 1968. Tree heights without a tape. J. Forestry 66: 60–61.

Appendix 3

1998–1999 Field Sampling Protocol and Field Forms

APPENDIX 3: 1998–1999 FIELD SAMPLING PROTOCOL AND FIELD FORMS

A Basic Guide for Field Work

Prepared for the 1999 Field Season, USGS/NPS Vegetation Mapping Program

This document is intended to give you general instructions and guidelines for conducting your fieldwork at Yosemite National Park. Detailed, field-by-field coding conventions for the primary form you will be completing in the field (the Plot Survey form) are provided in the "cheat sheet" at the back, along with an example of a form. A Fuel Inventory form and Accuracy Assessment Point form—other forms you will become very familiar with—are also included at the back for reference.

OVERVIEW

The data that you collect in Yosemite this year will be used to create a relatively fine scale delineation of vegetation pattern in Yosemite National Park and environs, an area of nearly 1.4 million acres across the east and west slopes of the Sierra Nevada. The range of habitats, and the corresponding diversity of vegetation types, found here is extremely complex. However, only broad-scale vegetation patterns (about 30 vegetation types for the park) have thus far been delineated (Moore, 1993). The understanding of finer-scale, ecologically distinct vegetation types that you will help create may be used by the park to plan appropriate management activities, monitor the results of these activities, track long-term changes in vegetation, direct searches for rare species, model fire behavior, and portray the wealth of natural diversity on park lands to the public.

Establishing a field sampling strategy that captures—in only two field seasons—sufficient data on all the distinct vegetation types in an area as large, diverse, and rugged as Yosemite is an ongoing challenge. To make the sampling as efficient as possible, the key environmental variables thought to be driving vegetation pattern were identified. These included factors such as slope, elevation, aspect, and geology (see NatureServe, 1998). The geographic locations of various classes of these environmental factors were then overlaid, and areas with unique combinations (called biophysical units or BPU's) were mapped. (For example, a west-slope, 5,000–7,000-foot elevation, southwest-facing, 3–35 degree slope with *granitic* geology was identified as a different biophysical unit from a west-slope, 5,000–7,000-foot elevation, southwest-facing 3–35 degree slope with *volcanic* geology.) The basic idea is that unique vegetation types may occur in each of the different habitats represented by the BPU's. Wherever possible, areas with clusters of these different BPU's in close proximity to each other *and* in close proximity to roads and trails were located, so that getting to these places to sample could be as easy as possible.

In the next (ongoing) step, photointerpreters will examine aerial photos of the areas identified by the (as yet unsampled) BPU's and make an educated guess about what type(s) of vegetation will be found there. These "guesses" are based on intensive field reconnaissance of all major ecological zones in the park and environs. We are fortunate in having interpreters who have extensive field experience and who have repeatedly taken the time to ground-truth their interpretations. The vegetation "types" they are choosing from when they tag their polygons are those included in the preliminary classification of park vegetation created using the U.S. National Vegetation Classification system (Grossman et al., 1998). The finest possible level of this classification system (the association level) is used wherever possible. The alliance, or a synthetic mapping unit that depicts the ecological setting of an otherwise unmappable vegetation type (for example, photodiscernable wetland hydrologic categories that may contain up to several small plant associations), is used if necessary.

The photointerpreters will attempt to select 15 polygons per association or alliance. Polygons are selected for their "representativeness" to the association or mapping unit. In addition, they are selected for accessibility in the field. The photointerpreters will give the selected, delineated polygons labeled with U.S. National Vegetation Classification types to the field coordinator, who will be keeping a running tally of the number of plots that still need to be established and sampled for each type.

The field coordinator will give you and your field partner your assignments based on the tally. You, your partner, and the field coordinator will be evaluating the data you collect in the field, assigning a second (still preliminary) vegetation type, and updating the tally of vegetation types *x* number of plots still needed. This

tally will be updated approximately every two weeks during the field season. The goal of this constant feedback and revision is to use *your* time as efficiently as possible—we are trying our best to avoid oversampling of some types and undersampling of others. Deciding where to sample to capture the full range of diversity over the park is going to be very much an iterative process as the field season goes along.

GETTING THERE

Once you have been given an "assignment" by your field coordinator, what you will actually have in hand is a photo print with a clear Mylar overlay marked with a dot indicating the representative core of the polygon. The coordinates for center of a polygon that the photointerpreters believe is all one distinct vegetation type. (The size of the polygon itself will, of course, vary depending on the extensiveness the vegetation type.) You and your partner will be navigating toward that polygon centroid using your road and trail maps and/or GPS, along with guidance from your field coordinator. The Mylar overlays may have roads and trails highlighted to help you as well. (You will be concentrating on "zones" of the park in sequence, so you will not have to traipse all over the park to do your fieldwork.)

The Mylar overlays will also be labeled with the following alphabetic key:

- a = A polygon of a vegetation type that is confidently mappable from the aerial photography and requires a total of three plots to support the classification/description of the type. The collection of field samples for these types is a high priority for both the classification and mapping efforts.
- b = A polygon that is probably not mappable from the aerial photography. The photointerpretation signature for such polygons is not expected to be clear due to the regularly small size of vegetation stands (below the minimum mapping unit), and/or complex interdigitation with other associations that have similar photo signatures. The priority for sampling these types is high for classification but less important overall than the "a types." Vegetation complexes and other environmental descriptors will be developed to provide polygon attributes for these types as they are encountered.
- c = Not used. These will not be indicated on the Mylar because all "c type" polygons are adequately sampled throughout the project area.
- d = A polygon that cannot be interpreted by the photointerpreters as any of the existing vegetation types in the working classification yet appears to represent a "new type" that recurs across the landscape within a given ecological zone. The collection of adequate plots in these types is a high priority. You will visit a subset of these polygons to determine whether: (1) this is a variant of an existing type or a mosaic of existing vegetation types or (2) this may represent a new vegetation type. If the former is true, then you will make a brief note using the observation point (accuracy assessment) form provided. If the latter is true, then you will take a full plot (until a total of three are taken for this new type).
- e = A polygon that photointerpreters have trouble identifying but does not appear to recur across the landscape. These represent isolated "question marks" from the photointerpreters. Observation Point forms should be filled out whenever these are encountered. However, these polygons are assumed to be of lower priority than the "d" polygons.

The order of priority for sampling is therefore: A, D, B, E, and C.

Note: Numerous selected polygons may also have question marks labeled next to the letter. This denotes some uncertainty as to the type labeled due to a number of factors.

Before you leave ... check that you have all the materials needed to complete your fieldwork. (Please see the checklist and "considerations for mission planning" at the end of this document to help you.)

Every single morning ... check your GPS receiver to make sure it is set to NAD27.

and

Along the way ... look around. Digital data layers are great, but they do **not** replace human perception. If, on the way to one vegetation type, you see an assemblage of plants that seems unique and that you think is not included on the list of vegetation types to be sampled, use your radio to contact the field coordinator. If you will be working with another team and may potentially overlap with vegetation types the team is sampling on a given day, be sure to contact the team using your radio and discuss what you have found, so that efforts are not duplicated or opportunities missed. You and the field coordinator or the other team may decide to change your plans and sample the vegetation pattern you discovered. Those of you who were part of last year's field effort are in an especially good position to help us "catch" vegetation types that may otherwise be missed. In many ways, this could be your most important contribution to the project.

ONCE THERE

Establishing a Plot

1) Figure out where to place your plot. This is a subjective process. You will want to place your plots in areas that seem to be both relatively **homogeneous** and **representative** of the vegetation of the polygon as a whole. In other words, avoid areas where the vegetation appears to be transitioning from one type to another and areas with anomalous or heterogeneous structure or species composition. Take some time to do this carefully because the plots you set up will be *permanent*—relocated and resampled over time to determine responses to management and other useful things. Look at *all* the vegetation strata to determine if the area is structurally and floristically uniform, and generally try to place your plots at least 30 meters from what you see as the "boundary" between this vegetation type and any neighboring, distinctly different types. During the training period, this step will be emphasized and discussed in detail. However, the rule of thumb is to conduct a reconnaissance of the plot if time and topography allow. If not, rely on the air photointerpreter "center dot" as a guide to where you should place your plot.

Note: In cases where a polygon is very heterogeneous, more than one plot may be needed. Again, look around, use that human perception, and contact your field coordinator via radio if you need guidance about whether or not to establish more than one plot.

2) Drive a piece of rebar into the ground with a rock or hammer. This will be the **SOUTHEAST** corner of your plot.

3) Using your GPS receiver, record the UTM of this corner of the plot under the **Field UTM X** and **Field UTM Y** on the field form. Remember that this is about to become a permanent plot, so being able to *find* it again will be key—use the GPS rather than estimating! (If you cannot get a GPS reading, estimate the coordinates from the topographic map and note on the form that you had to resort to this method.)

[PLGR/GPS instructions from NPS Staff here]

4) Stand at the rebar with your compass and direct your partner, who has the tape measure, to measure plot boundaries to the north and west (do not forget to correct for magnetic declination). Leave the tapes down as borders while working. Mark only the one corner with rebar. Standard plot sizes should be as follows:

If you are in a ...	You should usually make your plot ...	Giving you a plot area of ...
Forest (trees have their crowns overlapping, usually forming 60–100% cover)	20 m x 50 m	1,000 m ²
Woodland (open stands of trees with crowns usually not touching. Canopy tree cover is 25–60% OR exceeds shrub, dwarf-shrub, herb, and nonvascular cover)	20 m x 50 m	1,000 m ²
Shrubland (shrubs greater than 0.5 meter tall are dominant, usually forming more than 25% cover OR exceeding tree, dwarf-shrub, herb, and nonvascular cover)	20 m x 20 m	400 m ²

Dwarf-shrubland (heath) (shrubs less than 0.5 meter tall are dominant, usually forming more than 25% cover OR exceeding tree, shrub, herb, and nonvascular cover)	20 m x 20 m	400 m ²
Herbaceous (herbs dominant, usually forming more than 25% cover OR exceeding tree, shrub, dwarf-shrub, and nonvascular cover)	10 m x 10 m	100 m ²
Nonvascular (nonvascular cover dominant, usually forming more than 25% cover) (not being used in Yosemite)	5 m x 5 m	25 m ²

Note: You can deviate from the standard plot *shapes* where that makes sense, but the total plot *area* encompassed by the boundaries should be as listed above for each major class of vegetation. For example, forested riparian vegetation may be sampled in a more linear 10 x 100 meter (1000 m²) plot; herbaceous riparian or ridgeline vegetation in a 2 x 50 meter (100 m²) plot.

5) Once the plot is established, it is generally a good time to fill out the **Identifiers/Locators** part of your Plot Survey form (see the cheat sheet) and take the plot photos.

Taking photographs

[Guidelines for taking photos from NPS staff here].

Data Collection

Environmental Description

See the coding instructions at the end of this document for guidance on the specific fields.

Vegetation Description

For guidance on the specific fields on the second page of the form, see the coding instructions.

As you begin to collect the species, DBH, and cover information on page three, keep these four rules in mind—they will speed your data collection considerably.

1) If there are more than 25 trees over 10 centimeters DBH, measure a representative quarter of the plot (this may be any portion of the plot but should be 25 percent of the total plot area). **CLEARLY NOTE** on the form where this subsample was taken. Also, remember that DBH is an inherently inexact measurement (your breast height may be very different from the next ecologist's for one thing), so do not fret over this one—this should be a quick measurement!

2) Except in very diverse plots, do not spend more than **20 minutes** looking for new and different species to record. Remember that these plot data are to be used to classify the overall vegetation of the Park, not to make a complete species list for it. And if you had to spend much more than 20 minutes to *find* a species, it is probably not going to be important in characterizing the vegetation type. Based on field experience last year the most diverse plots were lower-elevation westside oak woodland and grassland plots. For these and other similarly diverse plots with over 25 taxa you may take up to 30 minutes on the listing process.

3) We have asked you to estimate in cover classes, but often it is helpful to make and attempt to estimate an actual percent cover for certain species. This may be useful in getting a sense of total vegetation cover (by adding percentages) and in determining to which category a species that is a borderline between two cover classes should be assigned. Try not to agonize over the percent cover column. This is only a rough visual estimate.

4) If you can't identify a plant to species, record the species on your form as "unknown species 1," "unknown species 2," "Carex unknown sp. 1," and so forth. Record cover class and other data for the unknown as you would for any other species. Then do one of two things.

If you need the species identified immediately because it appears to be dominant or diagnostic (you are seeing it all over the place or you are seeing much more in this particular vegetation type than in others), take a sample of the species with as much of the plant as possible, especially intact sexual parts, if present. Place the sample in a baggie, and label the baggie with the plot code and the name you gave it on the data form.

If you do not need the plant keyed immediately, press it. Mark the pressed specimen with the plot code and the name you gave it on the data form.

Give all your specimens, bagged and pressed, to the field coordinator for keying. You can, of course, key some of these yourself, but do not let plant keying get in the way of your primary responsibility—*field data collection*. No one expects you to identify every plant; that is why keying is considered part of the field coordinator's routine responsibilities. (Besides, he/she knows the flora pretty well and may be able to identify the specimen easily.) A quick prioritization of what to key and what to press may be made based on the recurrence of the species in samples and on the cover class estimate of the species in a particular plot. If the species has a high cover value ($> 1\%$), it is more of a priority to identify. Field crews should mark the specimen tag with its cover class estimate as well as its unique identifying number for the vegetation sample.

A sample Plot Survey form is provided at the end of this document.

Forest Fuel Inventory

In addition to the Plot Survey form, you will also be completing a Forest Fuel Inventory form for every plot you establish.

Fuel Data Collection Protocol

Dead and Downed Fuel Inventory: These data are collected along the long axis of the plot (or most northerly direction from plot marker at southeast corner if plot is square). For the purpose of the fuel inventory, this plot boundary will be referred to as the fuel transect.

SLOPE: Record in degrees the slope along the fuel transect.

DOWNED WOOD TALLY: Count all wood sticks crossing the transect line that are under 7.6 centimeters (3 inches) in diameter (< 100 -hour time lag fuels). Count twigs in three categories along the length of the transect indicated.

Fuel Type	Fuel Diameter	Tally Location
1) 1 hour	Less than 0.6 cm ($< 1/4$ in.)	First 2 m of transect
2) 10 hours	0.6 cm to 2.5 cm ($1/4$ –1 in.)	First 2 m of transect
3) 100 hours	2.5 cm to 7.6 cm (1–3 ins.)	First 4 m of transect

Begin at the 0.0 meter mark of the transect. Count all intercepts with the transect lines that are less than 0.6 centimeters for the first two meters of each transect line. Count all intercepts in the second category (0.6 centimeters to 2.5 centimeters) that cross the transect lines in the same two meters. Count all intercepts in the third category (2.5 centimeters to 7.6 centimeters) for the first four meters of the transect. A "Go-no-go," a metal template with size classes indicated, is useful during this tally.

LITTER and LIT/DUF: Measure the depth of the litter layer and the litter plus duff layer at the 0.5- and 1.5-meter points on the transect. Record to the nearest 0.1 centimeter. The litter plus duff layer includes material from mineral soil to the top of the litter layer. The litter layer includes litter from current year only.

SPECIES of 0–2.5 centimeter branchwood: Identify the dominant species represented by the 0–2.5 centimeters branchwood. If several species, estimate proportion of the two or three most common species.

DEAD FUEL DEPTH: Record greatest depth for each of three adjacent 0.3-meter lengths of the transect. Measure the heights from the bottom of freshly fallen material up to the highest intersected dead particle, and record the three measurements to the nearest centimeter. Include logs, overlapping large woody debris, and branches protruding vertically from the ground.

SOUND and ROTTEN Wood: Measure the diameter of all downed wood that is greater than 7.6 centimeters (3 inches) intersecting any part of the 15-meter transect. Measure only if the transect passes through the heartwood of the branch or log and if at least half of the branch or log is above ground. Record measurements to the nearest centimeter, and classify according to whether the branch is sound or rotten. Rotten wood is still holding its shape but is soft and punky.

Standing Fuel Inventory: This information is based on standing vegetation on the entire plot and follows guidelines and photos developed by R.E. Burgan and R.C. Rothermel (1984).

Herbaceous Fuel:

TYPE (1–4): Classify grasses into one of four types according to general morphology. Include herbaceous plants and grasses. Classify typical grasses and herbs rather than averaging a few plants or tufts over the entire plot.

- 1 = Fine, e.g., cheatgrass (*Bromus tectorum*)
- 2 = Medium, e.g., California brome (*Bromus carinatus*)
- 3 = Coarse, e.g., deergrass (*Muhlenbergia rigens*)
- 4 = Very coarse, e.g., sawgrass (*Mariscus*) (probably nothing in Yosemite region this coarse)

CLASS: (1–6) Further divide this type into one of six density classes.

DPTH: Record the average depth of herbaceous plants in centimeters. If there are two types present, record type, class, and depth of the "flashier" or more combustible one.

LIVE: Estimate what percentage of the grass is alive at any point during the growing season. This will always be 100 percent for annual species, somewhat less for perennials with previous year's litter attached.

Shrub Fuel:

Classify shrubs present in the entire plot according to Burgan and Rothermel guidelines. Average all species present.

TYPE (1–5): Classify shrubs into one of four types according to general morphology.

- 1 = Fine stems, thin leaves, e.g., mountain misery (*Chamaebatia foliolosa*)
- 2 = Medium stems, thin leaves, e.g., ninebark (*Physocarpus*)
- 3 = Medium stems, thick leaves, e.g., *Ceanothus*
- 4 = Densely packed fine stems and leaves, e.g., chamise (*Adenostoma fasciculatum*)
- 5 = Thick stems and leaves, e.g., manzanita (*Arctostaphylos* spp.)

CLASS (1–6): Determine to which of the five density classes the shrubs within the plot belong. Refer to Burgan and Rothermel photos.

DEAD 1HR, 10HR, 100HR and LIVE 1HR: Examine the dead wood and 1-hour live wood within the shrubs in the plot. Estimate what percent of the shrub is 1 hour live (< 0.6 cm), 1 hour dead, 10 hours dead (0.6–2.5 cm), and 100 hours dead (2.5 cm to 7.6 cm). The four percentages should add up to 100 percent.

WAX: If the leaves are waxy, sclerophyllous, or heavy with volatile oils (e.g., *Chamaebatia foliolosa*), enter Yes. Otherwise, enter No.

Litter and Woody Fuel:

% COVER: Estimate the percent of the plot covered by litter (1–100%).

SOURCE: This refers to the source of the leaf litter. Examine the litter on the ground, and classify the source of the litter as conifer, hardwood, or both if they both contribute at least 30 percent.

NEEDLES: Classify needle litter (where present) as Medium/Long (e.g., PIPO) or Short (e.g., ABCO).

COMPACTNESS: If the needles are loose and fresh, classify them as loose (e.g., ponderosa pine). If not, classify them as either normal or compact (e.g., red fir).

Total to 100%: Ocularly estimate the contribution from 1-hour, 10-hour, and 100-hour time lag fuels to the total litter on the ground in the plot. Leaf litter is included in the 1-hour class. Ensure that the three percentages add up to 100 percent.

Accuracy Assessment Point Form

Occasionally, you will need to collect some plot-free data. This will happen when

- 1) The photointerpreters cannot tell what kind of vegetation is in a particular polygon ("d" or "e" on the Mylar) *or*
- 2) The photointerpreters were wrong about what kind of vegetation is in a polygon *and* sufficient plot data have already been collected for the kind of vegetation that is actually there. (Check with your field coordinator via radio if you think this is the case.)

In these two cases, there is no need to establish a plot. However, you will help the photointerpreters identify this type in the future if you collect some data. You will navigate to the GPS centroid for the polygon as usual, scout out the polygon briefly to get a feel for what it is like, and record some general data to characterize it on an Accuracy Assessment Point form. This is an abbreviated version of the Plot Survey form, and the same cheat sheet can be used to help with filling it out. GPS points may be taken at any part of the polygon as long as it is greater than 30 meters from its edge, to verify its location.

We hope you find your field season at Yosemite enjoyable and rewarding. Best of luck!

LITERATURE CITED

Grossman, D.H., D. Faber-Langendoen, A.S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K.D. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and applications. NatureServe, Arlington, Virginia.

Moore, P.E. 1993. Preliminary descriptions of the terrestrial natural communities of Yosemite National Park, California. Unpublished report on file at the Yosemite Research Center.

NatureServe. 1998. An environmentally-driven approach to vegetation sampling and mapping at Yosemite National Park. Report prepared for the U.S. Department of the Interior National Biological Survey and National Park Service. NatureServe, Arlington, Virginia.

Instructions for filling out Fields in the PLOT SURVEY FORM (YOSE version, 18 May 1999)

Plot Code

Code indicating the specific plot within the vegetation polygon. For the 1999 field season, the codes will be "YOSE.XXX". To prevent possible duplication of codes, at the beginning of the field season one lead ecologist will take numbers 300–499 and the other will take 500–699. Each lead ecologist will use these numbers to sequentially number plots throughout the field season.

BPU Code

The biophysical unit identified will be provided by your field coordinator. This is a less important field this year and can be filled in based on a postprocessing of GIS data from the GIS analysts (Mike Schindel and/or Joe Meyer).

Provisional Community Name

Using the provisional classification of the park with which you have been provided, assign the name of the vegetation type that most closely resembles this type. Enter the finest level of the classification possible. What you put here may or may not agree with the photointerpretation. In fact, *none* of the names may be a good fit; you may have found a new type. The field coordinator will review the "provisional community name" in light of the data you collect and his/her knowledge of the park vegetation and of the classification. The provisional community name that he/she assigns will be used to update the types *x* number of plots needed tally.

State

CA

Park Name

YOSEMITE NP

Park Site Name

Provisional name assigned by fieldworker that describes where the data were collected. It should represent an identifiable feature on a topographic map.

Quad Name

Appropriate name/scale from survey map used; use 7.5-minute quadrangle if possible.

Quad Code

Code of quadrangle map.

Field UTM X

Use GPS; do not estimate. If you cannot get a GPS reading, estimate coordinates from a topographic map and note on the form that this method was used. Note for this and following field: All field crews have been trained in using a UTM grid and a topographic map to estimate within 20 meters of their actual UTM coordinates.

Field UTM Y

Use GPS; do not estimate. If you cannot get a GPS reading, estimate coordinates from a topographic map and note on the form that this method was used.

Survey Date

Date the survey was taken—year, month, day.

Surveyors

Names of surveyors, with principal surveyor (usually the lead ecologist) listed first.

Directions to Plot

Precise directions to the site using a landmark (e.g., a named point on the topographic map, a major highway, using park naming conventions for roads) readily locatable on a 7.5-minute topographic map as the starting point. Use clear sentences that will be understandable to someone who is unfamiliar with the area and has only your directions to follow. Give distances as closely as possible to 0.1 mile and use compass directions. Give additional directions to the plot within the site. Do not take more than a couple of minutes to fill this out.

Plot Length and Plot Width

Enter width and length dimensions for square or rectangular plots (or diameter for circular plots). Choose the appropriate plot size based on the following:

Vegetation Class	Standard Plot Dimensions	PLOT AREA
Forest	20 m x 50 m, or 17.8 m radius	1,000 m²
Woodland	20 m x 50 m, or 17.8 m radius	1,000 m²
Shrubland	20 m x 20 m, or 11.3 m radius	400 m²
Dwarf-Shrubland (heath)	20 m x 20 m, or 11.3 m radius	400 m²
Herbaceous	10 m x 10 m, or 5.65 m radius	100 m²
Nonvascular (not used in YOSE)	5 m x 5 m	25 m²

Plot Photos/Roll Number/Frame Numbers

Indicate (Y or N) if photos of the plot have been taken at the time of sampling and the roll and frame numbers of any photos. (Note: At least 2 photos should always be taken with the black-and-white camera for each plot.)

Plot Permanent

Check off that the plot has been permanently marked. All plots within the national park are "permanently marked" with the rebar. All nonwilderness plots on Forest Service Lands in the environs should also be marked.

Plot Representativeness

Does this plot represent the full variability of the polygon? If not, were additional plots taken? Note additional species not seen in plot in the space provided below. Note: We distinguish in this section from the plot's ability to represent the stand or polygon you are sampling as one component and the ability of this sample to represent the range of variability of the association in the environs. The former comment may be ascertained by reconnaissance of the stand. The latter comment comes only after some familiarity with the vegetation type throughout the mapping area and may be left blank if you have no opinion at this time.

ENVIRONMENTAL DESCRIPTION**Elevation**

Elevation of the plot. **Specify whether in feet or meters** (this will depend on the units used on the GPS or on the topographic map being used). In general, we have determined that the reading you get from a topographic map, provided you are certain where you are, is more accurate than the average reading from the GPS unit. Thus, please attempt to estimate your elevation with the topographic map.

Slope

Measure the slope in degrees using a clinometer.

Aspect

Measure the slope aspect using a compass (be sure to correct for the magnetic declination). Note: All compasses have been preset to an average declination for the park and thus, readings from the Suunto compasses carried by the field crews may be directly noted.

Topographic Position

Topographic position of the plot. Choose one.

INTERFLUVE (crest, summit, ridge). Linear top of ridge, hill, or mountain; the elevated area between two fluves (drainageways) that sheds water to the drainageways.

HIGH SLOPE (shoulder slope, upper slope, convex creep slope). Geomorphic component that forms the uppermost inclined surface at the top of a slope. Includes the transition zone from backslope to summit. Surface is dominantly convex in profile and erosional in origin.

HIGH LEVEL (mesa). Level top of a plateau.

MIDSLOPE (transportational midslope, middle slope). Intermediate slope position.

BACKSLOPE (dipslope). Subset of midslopes that are steep and linear and may include cliff segments (fall faces).

STEP IN SLOPE (ledge, terracette). Nearly level shelf interrupting a steep slope, rock wall, or cliff face.

LOWSLOPE (lower slope, footslope, colluvial footslope). Inner gently inclined surface at the base of a slope. Surface profile is generally concave and a transition between midslope or backslope and toeslope.

TOESLOPE (alluvial toeslope). Outermost gently inclined surface at base of a slope. In profile, commonly gentle and linear and characterized by alluvial deposition.

LOW LEVEL (terrace). Valley floor or shoreline representing the former position of an alluvial plain, lake, or shore.

CHANNEL WALL (bank). Sloping side of a channel.

CHANNEL BED (narrow valley bottom, gully arroyo). Bed of single or braided watercourse commonly barren of vegetation and formed of modern alluvium.

BASIN FLOOR (depression). Nearly level to gently sloping, bottom surface of a basin.

Landform

Enter the landform that describes the site where the plot was taken. Note that on the code sheet the landform choices are listed as being either macro, meso, or micro in scale. Thus, one can select one from each of these landscape scales for any plot (e.g., mountain could be macro, and cirque headwall could be meso). Your choices are

Macro-scale Types

canyon
escarpment
floodplain
glaciated uplands
gorge
hanging valley
hills
island
mountain valley
mountain(s)
mountain-valley fan
plateau
ridge & valley
rim
valley floor

Meso-scale Types

Bedrock outcrop, hillslope
Bedrock outcrop, ridgetop
bench
bottomland
channel
cirque floor fluvial
cirque headwall
cliff
col
colluvial slope
dome
drainage channel (undifferentiated)
draw
earth flow
eroded bench
eroding stream channel system
erosional stream terrace
hillslope bedrock outcrop
knob
knoll
lake/pond
lake bed
lake plain
lake terrace
lateral moraine
lava flow (undifferentiated)
ledge
levee
meander belt
meander scar
moraine (undifferentiated)
mud flat
patterned ground (undifferentiated)
periglacial boulderfield
pinnacle
ravine

ridge
ridgetop bedrock outcrop
riverbed
rock fall avalanche
saddle
scour
seep
slump pond
soil creep slope
stream terrace (undifferentiated)
streambed
swale
talus
tarn

Micro-scale Types

linear
mounded
concave
convex
hummocky
undulating

Surficial Geology

Note the geologic substrate influencing the plant community (bedrock or surficial materials). The list below provides an example of the values that might be included.

IGNEOUS ROCKS

Granitic (Granite, Schyolite, Syenite, Trachyte)
Ioritic (Diorite, Dacite, Andesite)
Gabbroic (Gabbro, Basalt, Pyroxenite, Peridotite)

SEDIMENTARY ROCKS

Conglomerates and Breccias
Sandstone
Siltstone
Shale
Limestone and Dolomite
Marble
Gypsum

METAMORPHIC ROCKS

Gneiss
Schist
Slate and Phyllite
Marble
Serpentine

GLACIAL DEPOSITS

Undifferentiated glacial deposit
Till
Moraine
Bedrock and till
GF
Glacio-fluvial deposits (outwash plains, ice-contacted GF deposits, eskers, kames, proglacial deltas, crevasse filling, etc.)
Deltaic deposits (alluvial cones, deltaic complexes)
Lacustrine and fluvial deposits (glacio-fluvial, fluvio-lacustrine, freshwater sandy beaches, stony/gravelly shoreline)

ORGANIC DEPOSITS

Peat (with clear fibric structure)
Muck
Marsh, regularly flooded by lake or river (high mineral content)

SLOPE AND MODIFIED DEPOSITS

talus and scree slopes
colluvial
solifluction, landslide

AEOLIAN DEPOSITS

dunes
aeolian sand flats
cover sands

Cowardin System

If the system is a wetland, check off the name of the United States Fish & Wildlife Services (USFWS) system that best describes its hydrology and landform. Indicate "upland" if the system is not a wetland.

Assess the hydrologic regime of the plot using the descriptions below (adapted from Cowardin et al., 1979).

SEMIPERMANENTLY FLOODED - Surface water persists throughout growing season in most years except during periods of drought. Land surface is normally saturated when water level drops below soil surface. Includes Cowardin's Intermittently Exposed and Semipermanently Flooded modifiers.

SEASONALLY FLOODED - Surface water is present for extended periods during the growing season but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to a water table well below the ground surface. Includes Cowardin's Seasonal, Seasonal-Saturated, and Seasonal-Well Drained modifiers.

SATURATED - Surface water is seldom present, but substrate is saturated to surface for extended periods during the growing season. Equivalent to Cowardin's Saturated modifier.

TEMPORARILY FLOODED - Surface water present for brief periods during growing season, but water table usually lies well below soil surface. Often characterizes floodplain wetlands. Equivalent to Cowardin's Temporary modifier.

INTERMITTENTLY FLOODED - Substrate is usually exposed, but surface water can be present for variable periods without detectable seasonal periodicity. Inundation is not predictable to a given season and is dependent on highly localized rainstorms. This modifier was developed for use in the arid west for water regimes of playa lakes, intermittent streams, and dry washes but can be used in other parts of the U.S. where appropriate. This modifier can be applied to both wetland and nonwetland situations. Equivalent to Cowardin's Intermittently Flooded modifier.

PERMANENTLY FLOODED - Water covers the land surface at all times of the year in all years. Equivalent to Cowardin's Permanently Flooded.

UNKNOWN - The water regime of the area is not known. The unit is simply described as a nontidal wetland.

Environmental Comments

Enter any additional noteworthy comments on the environmental setting. This field can be used to describe site history such as fire events (date since last fire or evidence of severity) as well as other disturbance or reproduction factors.

Soil Taxon/Description

This does not apply to the Yosemite Project.

Unvegetated Surface

Estimate the approximate percentage of the *total* surface area covered by each category. Only include categories with over 5 percent cover.

Soil Texture

Using the key below, assess average soil texture.

Simplified Key to Soil Texture (Brewer and McCann, 1982)

- A1 Soil does not remain in a ball when squeezed..... sand
- A2 Soil remains in a ball when squeezed B
- B1 Squeeze the ball between your thumb and forefinger, attempting to
 make a ribbon that you push up over your finger. Soil makes no
 ribbon loamy sand
- B2 Soil makes a ribbon; may be very short C
- C1 Ribbon extends less than 1 inch before breaking D
- C2 Ribbon extends 1 inch or more before breaking E
- D1 Add excess water to small amount of soil. Soil feels at least slightly gritty .. loam or sandy loam
- D2 Soil feels smooth silt loam
- E1 Soil makes a ribbon that breaks when 1–2 inches long; cracks if bent into a ring F
- E2 Soil makes a ribbon 2 or more inches long; does not crack
 when bent into a ring G
- F1 Add excess water to small amount of soil; soil feels at least slightly gritty sandy clay loam or
 clay loam
- F2 Soil feels smooth silty clay loam or silt
- G1 Add excess water to a small amount of soil; soil feels at least slightly gritty ... sandy clay or clay
- G2 Soil feels smooth silty clay

Soil Drainage

The soil drainage classes are defined in terms of actual moisture content (in excess of field moisture capacity) and the extent of the period during which excess water is present in the plant root zone. It is recognized that permeability, level of groundwater, and seepage are factors affecting moisture status. Because these are not easily observed or measured in the field, they cannot generally be used as criteria of moisture status. We further recognize that soil profile morphology, for example mottling, normally, but not always, reflects soil moisture status. Although soil morphology may be a valuable field indication of moisture status, it should not be the overriding criterion. Soil drainage classes cannot be based solely on the presence or absence of mottling. Topographic position and vegetation as well as soil morphology are useful field criteria for assessing soil moisture status.

RAPIDLY DRAINED - The soil moisture content seldom exceeds field capacity in any horizon except immediately after water addition. Soils are free from any evidence of gleying throughout the profile. Rapidly drained soils are commonly coarse textured or soils on steep slopes.

WELL DRAINED - The soil moisture content does not normally exceed field capacity in any horizon (except possibly the C) for a significant part of the year. Soils are usually free from mottling in the upper 3 feet but may be mottled below this depth. B horizons, if present, are reddish, brownish, or yellowish.

MODERATELY WELL DRAINED - The soil moisture in excess of field capacity remains for a small but significant period of the year. Soils are commonly mottled (chroma < 2) in the lower B and C horizons or below a depth of 2 feet. The Ae horizon, if present, may be faintly mottled in fine-textured soils and in medium-textured soils that have a slowly permeable layer below the solum. In grassland soils the B and C horizons may be only faintly mottled, and the A horizon may be relatively thick and dark.

SOMEWHAT POORLY DRAINED - The soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods during the year. Soils are commonly mottled in the B and C horizons; the Ae horizon, if present, may be mottled. The matrix generally has a lower chroma than in the well drained soil on similar parent material.

POORLY DRAINED - The soil moisture in excess of field capacity remains in all horizons for a large part of the year. The soils are usually very strongly gleyed. Except in high-chroma parent material the B, if present, and upper C horizons usually have matrix colors of low chroma. Faint mottling may occur throughout.

VERY POORLY DRAINED - Free water remains at or within 12 inches of the surface most of the year. The soils are usually very strongly gleyed. Subsurface horizons usually are of low chroma and yellowish to bluish hues. Mottling may be present but at the depth in the profile. Very poorly drained soils usually have a mucky or peaty surface horizon.

VEGETATION DESCRIPTION

Leaf Phenology

Select the value that best describes the leaf phenology of the dominant stratum. The dominant stratum is the uppermost stratum that contains at least 10 percent cover.

EVERGREEN - Greater than 75 percent of the total woody cover is never without green foliage.

COLD DECIDUOUS - Greater than 75 percent of the total woody cover sheds its foliage in connection with an unfavorable season mainly characterized by winter frost.

DROUGHT DECIDUOUS - Greater than 75 percent of the total woody cover sheds its foliage in connection with an unfavorable season mainly characterized by drought.

MIXED EVERGREEN - COLD DECIDUOUS - Evergreen and deciduous species generally contribute 25–75 percent of the total woody cover. Evergreen and cold deciduous species admixed.

MIXED EVERGREEN - DROUGHT DECIDUOUS - Evergreen and deciduous species generally contribute 25–75 percent of the total woody cover. Evergreen and drought deciduous species admixed.

PERENNIAL - Herbaceous vegetation composed of more than 50 percent perennial species.

ANNUAL - Herbaceous vegetation composed of more than 50 percent annual species.

Leaf Type

Select one value that best describes the leaf form of the dominant stratum. The dominant stratum is the uppermost stratum that contains at least 10 percent cover.

BROAD-LEAVED - Woody vegetation primarily broad-leaved (generally contributes greater than 50 percent of the total woody cover).

NEEDLE-LEAVED - Woody vegetation primarily needle-leaved (generally contributes greater than 50 percent cover).

MICROPHYLLOUS - Woody cover primarily microphyllous.

GRAMINOID - Herbaceous vegetation composed of more than 50 percent graminoid/stipe leaf species.

FORB (BROAD-LEAF HERBACEOUS) - Herbaceous vegetation composed of more than 50 percent broad-leaf forb species.

PTERIDOPHYTE - Herbaceous vegetation composed of more than 50 percent species with frond or frond-like leaves.

Physiognomic Class

Choose one.

- | | |
|------------------|--|
| Forest: | Trees with their crowns overlapping (generally forming 60–100 percent cover). |
| Woodland: | Open stands of trees with crowns not usually touching (generally forming 25–60% cover). Canopy tree cover may be less than 25 percent in cases where it exceeds shrub, dwarf-shrub, herb, and nonvascular cover, respectively. |
| Shrubland: | Shrubs generally greater than 0.5 meter tall with individuals or clumps overlapping to not touching (generally forming more than 25 percent cover, trees generally less than 25 percent cover). Shrub cover may be less than 25 percent where it exceeds tree, dwarf-shrub, herb, and nonvascular cover, respectively. Vegetation dominated by woody vines is generally treated in this class. |
| Dwarf-Shrubland: | Low-growing shrubs usually under 0.5 meter tall. Individuals or clumps overlapping to not touching (generally forming more than 25 percent cover, trees and tall shrubs generally less than 25% cover). Dwarf-shrub cover may be less than 25 percent where it exceeds tree, shrub, herb, and nonvascular cover, respectively. |
| Herbaceous: | Herbs (graminoids, forbs, and ferns) dominant (generally forming at least 25% cover; trees, shrubs, and dwarf-shrubs generally with less than 25% cover). Herb cover may be less than 25 percent where it exceeds tree, shrub, dwarf-shrub, and nonvascular cover, respectively. |

Nonvascular: Nonvascular cover (bryophytes, noncrustose lichens, and algae) dominant (generally forming at least 25% cover). Nonvascular cover may be less than 25 percent where it exceeds tree, shrub, dwarf-shrub, and herb cover, respectively.

Sparse Vegetation: Abiotic substrate features dominant. Vegetation is scattered to nearly absent and generally restricted to areas of concentrated resources (total vegetation cover is typically less than 25% and greater than 0%).

Strata/Life-Form, Height, Cover, Diagnostic Species

Emergent Tree: Tree strata that averages greater than 10 percent and is significantly taller than the main canopy for the stand.

Tree Canopy: The main tree canopy for the stand over which there may be a scattering of emergent trees and beneath which there may be an understory of subcanopy trees, shrubs, and/or herbs.

Tree Subcanopy: The small trees that may form a distinct layer beneath the canopy and the emergent trees.

Visually divide the community into vegetation layers (strata). Indicate the average height class of the stratum in the first column, using the Height Scale on the form. Enter the average percent cover class of the whole stratum in the second column, using the Cover Scale on the form. Height and cover classes are also listed below.

Trees are defined as single-stemmed woody plants, generally 5 meters in height or greater at maturity and under optimal growing conditions. Shrubs are defined as multiple-stemmed woody plants generally less than 5 meters in height at maturity and under optimal growing conditions. Note: Because many trees in California are large multiple-stemmed individuals as a result of past fire or other disturbance, the standard definition of a tree as a woody single-stemmed plant 5 meters or more tall has been modified to be any woody plant 5 meters or greater in height. A shrub is a woody plant that typically has multiple stems from the base and is less than 5 meters in height under optimal conditions. Tree seedlings and saplings are identified in the layer in which they occur (e.g., one could have *Pinus ponderosa* as a component of the herb strata, if there were saplings, and also of the T2 layer).

Because we are also interested in fuel model development for the vegetation, we are recording measurements on the height to the base of the lowest portion of the crown of representative species in each layer. This is defined as the lowest living branch on the tree or shrub. Thus, an estimate in meters is made between the ground and the lowest juncture of living branches to the trunk. This measurement need only be taken for one representative individual in each height strata.

List the dominant species in each stratum. If species known to be diagnostic of a particular vegetation type are present, list these as well, marking them with an asterisk.

Cover Scale for Strata		Height Scale for Strata	
01	< 5%	01	< 0.5 m
02	5–15%	02	0.5–1 m
03	15–25%	03	1–2 m
04	25–35%	04	2–5 m
05		05	5–10 m
35–45%		06	10–15 m
06		07	15–20 m
45–55%		08	20–35 m
07		09	35–50 m
55–65%		10	> 50 m
08			
65–75%			
09			
75–85%			

10	
85–95%	
11	
95–100%	

Animal Use Evidence

Comment on any evidence of use of the plot/polygon by nondomestic animals (i.e., tracks, scat, gopher or prairie dog mounds, etc.). Notes on domestic animals should be made in the field below.

Natural and Anthropogenic Disturbance

Comment on any evidence of natural or anthropogenic disturbance and specify the source.

Other Comments

Any other comments.

Species/DBH/Percent Cover Table

Starting with the uppermost stratum, list all the species present and cover class (using the scale provided below) and percent cover of each species in that particular stratum. Indicate strata in the left-hand columns. If in the tree layer (single-stemmed woody plants, generally 5 meters in height or greater at maturity), note in the "T" column if T1 (emergent tree), T2 (tree canopy), or T3 (tree subcanopy). If in the shrub layer, note in the "S" column if S1 (tall shrub) or S2 (short shrub). If in the ground layer, note in the "G" column if H (herbaceous), N (nonvascular), V (vine/liana), or E (epiphyte). Tree seedlings are treated in the G column and are indicated by whichever layer name seems most appropriate (e.g., if most seedlings are as tall as the H layer then they are treated as H). Tall shrubs are typically between 0.5 and 5 meters while short shrubs are less than or equal to 0.5 meter. Note that you may list the same species in more than one stratum, based on the maximum height of the individuals, however, those canopy tree-sized individuals should only be listed in the canopy tree category, and those herb-size individuals should only be listed in the H layer.

For plots with trees, list the DBH (in centimeters) of all trees above 10 centimeters diameter (this would include each stem from a multistemmed tree). Separate the measurements with a comma. For plots with very high tree density, DBH measurements will be done in a subplot. If the number of trees with a DBH greater than 10 centimeters is more than 25, divide the plot into quarters and measure the DBH of trees in the most representative quadrant. CLEARLY NOTE on the form that this is what you have done.

Cover Scale for Species Percent Cover

Code	Range of Class	Class midpoint
01	> 0–1%	0.5%
02	1–5%	3%
03	5–25%	15%
04	25–50%	37.5%
05	50–75%	62.5%
06	75–100%	87.5%

NATIONAL PARK VEGETATION MAPPING PROGRAM: PLOT SURVEY FORM (YOSE version, 10 May, 99)

IDENTIFIERS/LOCATORS

Plot Code <u>YOSE</u>		BPU Code _____	
Provisional Community Name _____			
State <u>CA</u>	Park Name <u>YOSEMITE NP</u>	Park Site Name _____	
Quad Name _____		Quad Code _____	
GPS File Name _____	Field UTM X _____	m E	Field UTM Y _____ m N
		Error +/- _____ m	
Corrected UTM X _____	m E	Corrected UTM Y _____	m N UTM Zone 11

Survey Date _____ Surveyors _____	
Directions to Plot _____	
Plot length (m) _____ Plot width (m) _____ If circle (diam) _____ Plot Photos (y/n) _____ Roll Number _____ Frame Numbers _____	
Plot Permanent (y/n) _____ (For location of marker and location and orientation of photos, see other comments.)	
Plot representativeness (discuss decisions for placement and/or reasons for nonrepresentativeness)	
a. Representativeness of association (if known):	
b. Representativeness of plot in stand:	

ENVIRONMENTAL DESCRIPTION

Elevation _____	Slope _____	Aspect _____
Topographic Position (see cheat sheet)		
Landform (see cheat sheet)		
Surficial Geology (see cheat sheet)		

Cowardian System	<u>Nontidal</u>		
<input type="checkbox"/> Upland	<input type="checkbox"/> Permanently Flooded	<input type="checkbox"/> Saturated	<input type="checkbox"/> Unknown
<input type="checkbox"/> Riverine	<input type="checkbox"/> Semipermanently Flooded	<input type="checkbox"/> Seasonally Flooded	
<input type="checkbox"/> Palustrine	<input type="checkbox"/> Temporarily Flooded	<input type="checkbox"/> Intermittently Flooded	
<input type="checkbox"/> Lacustrine			

Environmental Comments (dynamic stage, fire history, insect damage, etc.):	Unvegetated Surface: % <input type="checkbox"/> Bedrock <input type="checkbox"/> Litter, duff <input type="checkbox"/> Wood (> 1 cm) <input type="checkbox"/> Large rocks (cobbles, boulders > 10 cm) <input type="checkbox"/> Small rocks (gravel, 0.2–10 cm) <input type="checkbox"/> Sand (0.1–2 mm) <input type="checkbox"/> Bare soil Other: _____
Soil Texture: <input type="checkbox"/> sand <input type="checkbox"/> loamy sand <input type="checkbox"/> sandy loam <input type="checkbox"/> loam <input type="checkbox"/> silt loam <input type="checkbox"/> silt <input type="checkbox"/> clay loam <input type="checkbox"/> silty clay <input type="checkbox"/> clay <input type="checkbox"/> peat <input type="checkbox"/> muck	Soil Drainage <input type="checkbox"/> Rapidly drained <input type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input type="checkbox"/> Very poorly drained

VEGETATION DESCRIPTION

Leaf phenology (of dominant stratum) <u>Trees and Shrubs</u>	Leaf Type (of dominant stratum)	Physiognomic class	Cover Scale for Strata and Unvegetated Surface	Height Scale for Strata
<input type="checkbox"/> Evergreen	<input type="checkbox"/> Broad-leaved	<input type="checkbox"/> Forest	1 0–1%	01 < 0.5 m
<input type="checkbox"/> Cold deciduous	<input type="checkbox"/> Needle-leaved	<input type="checkbox"/> Woodland	2 > 1–5%	02 0.5–1 m
<input type="checkbox"/> Drought deciduous	<input type="checkbox"/> Microphyllous	<input type="checkbox"/> Shrubland	3 > 5–25%	03 1–2 m
<input type="checkbox"/> Mixed evergreen - cold deciduous	<input type="checkbox"/> Graminoid	<input type="checkbox"/> Dwarf-Shrubland	4 > 25–50%	04 2–5 m
<input type="checkbox"/> Mixed evergreen - drought deciduous	<input type="checkbox"/> Forb	<input type="checkbox"/> Herbaceous	5 > 50–75%	05 5–10 m
	<input type="checkbox"/> Pteridophyte	<input type="checkbox"/> Nonvascular	6 > 75%	06 10–15 m
		<input type="checkbox"/> Sparsely Vegetated		07 15–20 m
				08 20–35 m
				09 35–50 m
				10 > 50 m
<u>Herbs</u>				
<input type="checkbox"/> Annual				
<input type="checkbox"/> Perennial				

	Height/Strata Class	Cover Class	Height to Base (Class)	Dominant Species (mark diagnostics with *)
T1 Emergent	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
T2 Canopy	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
T3 Subcanopy	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
S1 Tall shrub	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
S2 Short shrub	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
H Herbaceous	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
N Nonvascular	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
V Vine/Liana	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
E Epiphyte	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Please see above table for height and cover scales.				

Animal Use Evidence (including scat, browse, graze, burrows, bedding sites, etc.)

Natural and Anthropogenic Disturbance Comments (Please see cheat sheet for impact codes; list intensity as H, M, or L.)

Other Comments (locations of photos and perm plot marker)

Plot Code _____ Page _____ of _____

G=Ground, Layer S= shrub layer, T = tree layer. Use strata codes on page 2 of form to indicate which strata are represented for each species.

[illegible]

Total Vegetation Cover (Class/%): ____/____ Total Non-Native (Class/%) ____/____

YOSEMITE CODE LIST**LANDFORM****Macro-scale types**

canyon
escarpment
floodplain
glaciated uplands
gorge
hanging valley
hills
island
mountain valley
mountain(s)
mountain valley fan
plateau
ridge and valley
rim
valley floor

Meso-scale types

Bedrock outcrop, hillslope
Bedrock outcrop, ridgetop
bench
bottomland
channel
cirque floor fluvial
cirque headwall
cliff
col
colluvial slope
dome
drainage channel (undifferentiated)
draw
earth flow
eroded bench
eroding stream channel system
erosional stream terrace
hillslope bedrock outcrop
knob
knoll
lake/pond
lake bed
lake plain
lake terrace
lateral moraine
lava flow (undifferentiated)
ledge
levee
meander belt
meander scar
moraine (undifferentiated)
mud flat
patterned ground (undifferentiated)
periglacial boulderfield
pinnacle
ravine
ridge
ridgetop bedrock outcrop
riverbed
rock fall avalanche
saddle
scour
seep
slump pond
soil creep slope
stream terrace (undifferentiated)
streambed
swale
talus
tarn

Micro-scale Types

linear
mounded
concave

ASPECT

flat (n/a)
variable
N 338–22
NE 23–67
E 68–112
SE 113–157
S 158–202
SW 203–247
W 248–292
NW 293–337

TOPOGRAPHIC POSITION

Designation	Synonym(s)
Interfluvium	crest, summit, upper slope, shoulder slope
High level	mesa
Midslope	transportational
Backslope	dipslope
Step in slope	ledge, terracette
Lowslope	lower slope, foot
Toeslope	alluvial toeslope
Low level	terrace
Channel wall	bank
Channel bed	narrow valley
Basin floor	depression

SOIL TEXTURE

Sand
Sandy loam
Loam
Silt loam
Clay loam
Clay
Peat
Muck

DRAINAGE

Rapidly drained
Well drained
Moderately well drained
Somewhat poorly drained
Poorly drained
Very poorly drained

SURFICIAL GEOLOGY

Igneous Rocks: Granitic
Igneous Rocks: Dioritic
Igneous Rocks: Gabbroic
Sedimentary Rocks: Conglomerates and Breccias
Sedimentary Rocks: Sandstone
Sedimentary Rocks: Siltstone
Sedimentary Rocks: Shale
Sedimentary Rocks: Limestone and Dolomite
Metamorphic Rocks: Gneiss
Metamorphic Rocks: Schist
Metamorphic Rocks: Slate and Phyllite
Metamorphic Rocks: Marble
Metamorphic Rocks: Serpentine
Glacial Deposits: Undifferentiated glacial deposit
Glacial Deposits: Till
Glacial Deposits: Moraine
Glacial Deposits: Bedrock and till
Glacial Deposits: Glacial-fluvial deposits
Glacial Deposits: Deltaic deposits
Glacial Deposits: Lacustrine and fluvial deposits
Organic Deposits: Peat
Organic Deposits: Muck
Organic Deposits: Marsh: regularly flooded by lake or river
Slope and Modified Deposits: Talus and scree slopes
Slope and Modified Deposits: Colluvial
Slope and Modified Deposits: Solifluction, landslide
Aeolian Deposits: Aeolian sand flats
Aeolian Deposits: Cover sands

IMPACTS

01 Development
02 ORV activity
03 Agriculture
04 Grazing
05 Competition from exotics
06 Logging
07 Insufficient population/stand size
08 Altered flood/tidal regime
09 Mining
10 Hybridization
11 Groundwater pumping
12 Dam/Inundation
13 Other
14 Surface water diversion
15 Road/Trail construction/maint.
16 Biocides
17 Pollution
18 Unknown
19 Vandalism/Dumping/Litter
20 Foot traffic/trampling
21 Improper burning regime
22 Over collecting/poaching
23 Erosion/Runoff
24 Altered thermal regime
25 Landfill
26 Degrading water quality
27 Wood cutting
28 Military operations
29 Recreational use (non ORV)
30 Nest parasitism
31 Non-native predators
32 Rip-rap, bank protection
33 Channelization (human caused)
34 Feral pigs
35 Burros
36 Rills
37 Phytogenic mounding

convex
hummocky
undulating

Materials checklist

road/trail maps
2 tape measure(s)
DBH tape or plastic DBH measurement device
compass
rebar (1 piece per plot, plus extra)
small sledgehammer (for driving rebar into ground)
PLGR (checked daily to ensure that it is set to NAD27)
radio
clinometer
camera and film (allow at least 3 exposures per plot)
baggies
plant press and paper
pens/permanent markers
Plot Survey forms
Forest Fuel forms
Accuracy Assessment Point forms
white board
dry-erase markers (for white board)
most recent version of provisional classification of the park x number of plots needed per type (updated approx. every 2 weeks)

CONSIDERATIONS FOR MISSION PLANNING: PHASE II FIELD SAMPLING FOR YOSEMITE VEGETATION MAPPING PROJECT

Planning for the Day: (ecologist/team leader)

1. Decide crew membership
2. Safety and sustenance issues (food, water, first-aid kit, water filter [if appropriate])
3. Field communications
 - a. Develop plan with other team for radio check-in time regarding plot types and contingencies for duplication problems
 - b. Do you have radio, and are batteries charged?
4. Check GPS (batteries, memory available, priority sample waypoints logged from AIS table)
5. Checklist for all other field equipment
 - clipboard
 - pens, pencils
 - compass/clinometer
 - two tape measures
 - plastic bags for plants
 - masking tape and sharpies for labeling specimens
 - if longer mission, small plant press with adequate blotters and newspaper
 - sufficient field forms for all possible samples
 - all ancillary information (cheat sheet, species list, key, sampling priority list for zone, PI coded classification list, fuels protocol, main sampling protocol)
6. Plan day's mission before departure using one copy per team of
 - a) USGS quad
 - b) Hard-copy digital ortho quarter quads with flagged points
 - c) Aerial photo with coded overlay
7. Considerations for mission planning
 - a. Based on topography, existing access routes, density, and complexity of vegetation (more time for forest and woodland plots, less for herbaceous and scrub)

- b. Based on priority needs (location of clusters of a, b, d, and e polygons and asterisks if possible [if en route to or visible from priority sample polygons])
- c. Based on possible redundancy of other team (adequate alternative samples)

Planning for the Week: (field coordinator)

1. With which 7.5-minute quads will you be working? Do you have all appropriate maps, photos, and DOQQs?
2. Develop estimate of reasonable expectations of plots to choose for each team broken up by day and based on estimate of individual team's travel logistics for the week
3. Develop plan of attack for the week to capture all essentials (a, b, and then some d, e, and asterisks)
4. Balance points 2 and 3 above with the expected work schedule of the teams, ensure adequate time off, and reduce overtime concerns.
5. Do you have all necessary information for weekly planning?
 - a) AIS DOQQs for the zone
 - b) Adequate field copies of air photos (1 per team if both will be working on same photo)
 - c) Blank field forms
6. Communication with management team (Peggy, Todd, Jim, Debbie, or some appropriate subset) and field crews
 - a. Update matrix of sampled plots by type
 - b. All uncertainties dealt with (new types seen, should we sample?, problems with interpreting PI information, personnel issues, problems in interpreting classification/key, park-related logistics)
7. Communication with field crews
 - a. Obtain QC'd field forms (allow time for your QC and resolving your questions about the forms with crews)
 - b. Obtain all plants not identified (allow time for plant I.D.)
 - c. What were their questions about the polygons they visited?
 - d. What was accomplished, what was not accomplished?

Planning for the Ecological Zone: (field coordinator)

1. Do you have all the tools you need for planning the zone?
 - a. Vegetation matrix updated for the zone by AIS and classification team
 - b. Vegetation key for zone
 - c. All DOQQs and photographs delineated with array of points chosen by AIS accommodations worked out (camping logistics including bear-proofing considerations, temporary residence if on east side or other area remote from Midpines)
2. How many plots of a, b, and d polygons do you need?
3. How many e polygons and green asterisk questions do the PIs have?
4. Factor points 2 and 3 into the equation of days needed and locations focused upon
5. Consider the dispersion of sample plots to capture range of variability
6. Do not shift to new zone or zone group until all targets are adequately captured unless considerations have been discussed by management team.

Clarifications to procedures, made 5/24/99

1. Classification categories for the notation of polygons in the photointerpretation process. These categories refer to both vegetation classification types (as determined by the ecologists) and to polygon signatures that cannot be tied to one of the existing vegetation types. The sampling implications for each are different.
 - A Type Polygons: **Vegetation types** that have (or are expected to have) a clear photointerpreter signature and do not yet have the requisite number of samples. Collection of field samples for these types is a high priority for both classification and the mapping efforts. Full quantitative plots should be collected for these polygons until the total desired number of plots for each of these types is captured.
 - B Type Polygons: **Vegetation types** that are not expected to have a clear photointerpreter signature due to standard size of occurrence, shape and pattern of distribution, and complex interdigitation with other associations across the landscape. The priority for sampling these types is high for classification but less important overall than for the A Types because the relationship to map signatures is complex. Vegetation complexes and other environmental descriptors will be developed to provide polygon attributes for these types as they are photointerpreted and encountered on the landscape (see D Type polygons).
 - C Type Polygons: **Vegetation types** that also have a clear photointerpreter signature and have been sufficiently sampled. These types do not require additional field effort.
 - D Type Polygons: **Photo signatures** that cannot be interpreted by the photointerpreters in relation to any of the existing vegetation types yet reoccur consistently across an ecological zone. The collection of a sufficient amount of field data for this **signature** is a high priority so that the photointerpreters can attribute these correctly. The field crew will visit a subset of these polygons to determine whether this (1) is a variant of an existing vegetation type or mosaic of existing vegetation types (note the types and take an observation plot) or (2) may represent a new vegetation type (take a plot).
 - E Type Polygons: **Photo signatures** that cannot be interpreted by the photointerpreters in relation to any of the existing vegetation types and do not reappear consistently across an ecological zone. These types should be visited as possible so that we can figure out how to deal with them in our classification/mapping protocols. Observation point forms should be filled out for E Type polygons visited (with the assumption that none of these would constitute a new global vegetation type).

The order of priority for sampling is therefore A, D, B, E, and C.
2. There are new vegetation types recognized as the result of the ecology/photointerpretation reconnaissance trips to each ecological zone. How should these types be categorized?

When the ecologist (primarily Todd or Peggy) makes a decision regarding the recognition of a new vegetation type, they will decide whether these should be categorized as Type A or B and will allocate the field sampling needs accordingly. It may be useful during these trips to attempt to determine classification conventions for complex vegetation assemblages that are encountered in the ecological zone.
3. What should the field crews do when they "discover" new vegetation types while in the field?

When the crew recognizes associations that appear to be repeating in the field with a consistent pattern of composition, structure, and habitat, they should approach this as an A Type and take quantitative samples accordingly. New types should be reviewed as quickly as possible by Todd and Peggy for their assessment.
4. Collecting and keying out plant specimens

When an unknown plant species is encountered in the plot it should be collected. All specimens need to be tagged so the importance of immediate keying can be assessed. Higher priority will be given to specimens that are critical for classification (have a high cover value) and are encountered often across multiple plots (have a high annoyance value). These specimens should be held for keying at the earliest possible time. The identification of these should be shared with the entire field crew so they do not continue to collect them. The other specimens should be labeled and pressed. They will be identified during and after the season by outside experts. All unknowns will eventually be identified and entered into the plot database.

Appendix 4

Fuels Sampling Protocols for Yosemite 1998 and 1999 Field Data Collection

APPENDIX 4: FUELS SAMPLING PROTOCOLS FOR YOSEMITE 1998 AND 1999 FIELD DATA COLLECTION

FOREST FUEL INVENTORY – YOSEMITE NATIONAL PARK

In addition to the Plot Survey form, a Forest Fuel Inventory form will also be completed for every shrubland, woodland, and forested plot established.

Fuel Data Collection Protocol

Brown Transect (Dead and Downed Fuel Inventory): These data are collected along the long axis of the plot (or most northerly direction from plot marker at southeast corner if plot is square). For the purpose of the fuel inventory, this plot boundary will be referred to as the fuel transect.

SLOPE: Record in degrees the slope along the fuel transect.

DOWNED WOOD TALLY: Count all wood sticks crossing the transect line that are under 7.6 centimeters (3 inches) in diameter (< 100 hour time lag fuels). Count twigs in three categories along the length of the transect indicated.

Fuel Type	Fuel Diameter	Tally Location
1) 1 hour	Less than 0.6 cm (< 1/4 in.)	First 2 m of transect
2) 10 hours	0.6 cm to 2.5 cm (1/4–1 in.)	First 2 m of transect
3) 100 hours	2.5 cm to 7.6 cm (1–3 ins.)	First 4 m of transect

Begin at the 0.0 meter mark of the transect. Count all intercepts with the transect lines that are less than 0.6 centimeter for the first two meters of each transect line. Count all intercepts in the second category (0.6 centimeter to 2.5 centimeters) that cross the transect lines in the same two meters. Count all intercepts in the third category (2.5 centimeter to 7.6 centimeters) for the first four meters of the transect. A "Go-no-go," a metal template with size classes indicated, is useful during this tally.

LITTER and LIT/DUF: Measure the depth of the litter layer and the litter plus duff layer at the 0.5 and 1.5-meter points on the transect. Record to the nearest 0.1 centimeter. The litter plus duff layer includes material from mineral soil to the top of the litter layer. The litter layer includes litter from current year only.

SPECIES of 0–2.5 centimeters branchwood: Identify the dominant species represented by the 0–2.5 centimeters branchwood. If several species, estimate proportion of the two or three most common species.

DEAD FUEL DEPTH: Record greatest depth for each of three adjacent 0.3 meter lengths of the transect. Measure the heights from bottom of freshly fallen material up to the highest intersected dead particle, and record the three measurements to the nearest centimeter. Include logs, overlapping large woody debris, and branches protruding vertically from the ground.

SOUND and ROTTEN Wood: Measure the diameter of all downed wood that is greater than 7.6 centimeters (3 inches) in diameter intersecting any part of the 15-meter transect. Measure only if the transect passes through the heartwood of the branch or log and if at least half of the branch or log is above ground. Record measurements to the nearest centimeter, and classify according to whether the branch is sound or rotten. Rotten wood still holds its shape yet is soft and punky.

Burgan and Rothermel Fuel Inventory (Standing Fuel Inventory): This information is based on standing vegetation on the entire plot and follows guidelines and photos developed by R.E. Burgan and R.C. Rothermel (1984).

Herbaceous Fuel:

TYPE (1–4): Classify grasses into one of four types according to general morphology. Include herbaceous plants and grasses. Classify typical grasses and herbs rather than averaging a few plants or tufts over the entire plot.

1 = Fine, e.g., cheatgrass (*Bromus tectorum*)

- 2 = Medium, e.g., California brome (*Bromus carinatus*)
- 3 = Coarse, e.g., deergrass (*Muhlenbergia rigens*)
- 4 = Very coarse, e.g., sawgrass (*Mariscus*) (probably nothing in Sequoia and Kings Canyon region this coarse)

CLASS: (1–6) Further divide this type into one of six density classes.

DPTH: Record the average depth of herbaceous plants in centimeters. If there are 2 types present, record type, class, and depth of the "flashier" or more combustible one.

LIVE: Estimate what percentage of the grass is alive at any point during the growing season. This will always be 100 percent for annual species, somewhat less for perennials with previous year's litter attached.

Shrub Fuel:

Classify shrubs present in the entire plot according to Burgan and Rothermel guidelines. Average all species present.

TYPE (1–5): Classify shrubs into one of five types according to general morphology.

- 1 = Fine stems, thin leaves; e.g., mountain misery (*Chamaebatia foliolosa*)
- 2 = Medium stems, thin leaves; e.g., ninebark (*Physocarpus*)
- 3 = Medium stems, thick leaves; e.g., *Ceanothus*
- 4 = Densely packed fine stems and leaves; e.g., chamise (*Adenostoma fasciculatum*)
- 5 = Thick stems and leaves; e.g., manzanita (*Arctostaphylos* spp.)

CLASS (1–6): Determine to which of the five density classes the shrubs within the plot belong. Refer to Burgan and Rothermel photos.

DEAD 1HR, 10HR, 100HR and LIVE 1HR: Examine the dead wood and 1-hour live wood within the shrubs in the plot. Estimate what percent of the shrub is 1-hour live (< 0.6 centimeter), 1-hour dead, 10-hour dead (0.6–2.5 centimeter), and 100-hour dead (2.5 centimeters to 7.6 centimeters). The four percentages should add up to 100 percent.

WAX: If the leaves are waxy, sclerophyllous, or heavy with volatile oils (e.g., *Chamaebatia foliolosa*), enter Yes. Otherwise, enter No.

Litter and Woody Fuel:

% COVER: Estimate the percent of the plot covered by litter (1–100%).

SOURCE: This refers to the source of the leaf litter. Examine the litter on the ground and classify the source of the litter as conifer, hardwood, or both if they both contribute at least 30 percent.

NEEDLES: Classify needle litter (where present) as Medium/Long (e.g., PIPO) or Short (e.g., ABCO).

COMPACTNESS: If the needles are loose and fresh, classify them as loose (e.g., ponderosa pine). If not, classify them as either normal or compact (e.g., red fir).

Total to 100%: Ocularly estimate the contribution from 1-hour, 10-hour, and 100-hour time lag fuels to the total litter on the ground in the plot. Leaf litter is included in the 1-hour class. Ensure that the three percentages add up to 100 percent.

Yosemite National Park
Vegetation mapping: Fuel inventory

YOSE Fuels inventory field form.doc

Plot # _____ Date _____ Observers _____

Brown Transect									
					Depth 0.5 m		Depth 1.5 m		
Slope (deg)	0–0.6 cm Tally for 2 m	0.6–2.5 cm Tally for 2 m	2.5–07.6 cm Tally for 4 m		Litter 0.1 cm	Lit/Duff 0.1 cm	Litter 0.1 cm	Lit/Duff 0.1 cm	
Species of 0.0–2.5 cm Branchwood:					Dead fuel depth (cm)				
Diameter sound (cm) for 15 m					Diameter rotten (cm) for 15 m				

Burgan and Rothermal Fuel Inventory											
Herbaceous fuel		% cover		Shrub fuel						% cover	
Type 1–4	Class 1–6	Depth 1 cm	Live 1%	Type 1–5	Class 1–6	Depth 1 cm	Total to 100%			Wax: Y/N	
							Dead		Live		
							1 hr	10 hr	100 hr		
Litter and Woody Fuel									% Cover Total to 100%		
Source		Needles		Compactness							
1. Conifers 2. Hardwoods 3. Both		1. Medium/Long (PICO, PIPO) 2. Short (ABCO) 3. Both > 30%		1. Loose (Fresh) 2. Normal 3. Compact (Old)		1 hr		10 hr	100 hr		

Appendix 5

New Vegetation Types Defined or Proposed Based on Data from this Project

APPENDIX 5: NEW VEGETATION TYPES DEFINED OR PROPOSED BASED ON DATA FROM THIS PROJECT

Types needing additional sampling for verification

This appendix provides a list of associations newly defined from data associated with the Yosemite vegetation mapping effort. Descriptions are available where the sample size for a type is at least three plots; however, these types are still preliminary and require further sampling for verification. See complete list of types in Section III for sample sizes.

Herbaceous Vegetation:

Blue wildrye Herbaceous Vegetation (*Elymus glaucus* Herbaceous Vegetation)

Blue wildrye-Wooly sedge Herbaceous Vegetation (*Elymus glaucus*-*Carex lanuginosa* Herbaceous Vegetation)

Blue wildrye-Sedge Herbaceous Vegetation (*Elymus glaucus*-*Carex feta* Herbaceous Vegetation)

Shorthair reedgrass-Alpine aster Herbaceous Vegetation (*Calamagrostis breweri*-*Aster alpigenus* Herbaceous Vegetation)

Shorthair reedgrass-Spike trisetum Herbaceous Vegetation (*Calamagrostis breweri*-*Trisetum spicatum* Herbaceous Vegetation)

Shorthair sedge-Spike trisetum Herbaceous Vegetation (*Carex exserta*-*Trisetum spicatum* Herbaceous Vegetation)

Shorthair sedge-Sierran beardtongue Herbaceous Vegetation (*Carex exserta*-*Penstemon heterodoxus* Herbaceous Vegetation)

CAREX HELLERI HERBACEOUS ALLIANCE (TAYLOR, 1984)

Heller sedge-Silvery buckwheat-Silky raillardella Herbaceous Vegetation (*Carex helleri*-*Eriogonum incanum*-*Raillardella argentea* Herbaceous Vegetation) Taylor (1984)

Heller sedge-Alpine saxifrage-Woodrush Herbaceous Vegetation (*Carex helleri*-*Saxifraga tolmiei*-*Luzula spicata* Herbaceous Vegetation) (Taylor, 1984)

Heller sedge-Parry rush Herbaceous Vegetation (*Carex helleri*-*Juncus parryi* Herbaceous Vegetation) (Taylor, 1984)

Intermediate oat grass-Alpine pussytoes Herbaceous Vegetation (*Danthonia intermedia*-*Antennaria rosea* Herbaceous Vegetation)

Danthonia intermedia-*Ptilagrostis kingii* Herbaceous Vegetation (n=1)

Parry rush-Showy sedge-Sibbaldia Herbaceous Vegetation (*Juncus parryi*-*Carex spectabilis*-*Sibbaldia procumbens* Herbaceous Vegetation)

Tall mannagrass Herbaceous Vegetation (*Glyceria striata* [*G. elata*, Hickman 1993] Herbaceous Vegetation)

Canadian reedgrass Herbaceous Vegetation (*Calamagrostis canadensis* Herbaceous Vegetation)

Blackish sedge/Mountain laurel Herbaceous Vegetation (*Carex nigricans*/*Kalmia polifolia* Herbaceous Vegetation) (Taylor, 1984)

Rocky Mountain sedge Herbaceous Vegetation (*Carex scopulorum* Herbaceous Vegetation)

Nevada rush - hare sedge Herbaceous Vegetation (*Juncus nevadensis*-*Carex leporinella* Herbaceous Vegetation)

Sierra ricegrass Herbaceous Vegetation (*Ptilagrostis kingii* Herbaceous Vegetation)

Cattail Herbaceous Vegetation (*Typha* spp. Herbaceous Vegetation)

Shrubby cinquefoil/intermediate oat grass Herbaceous Vegetation (*Potentilla fruticosa*/*Danthonia intermedia* Herbaceous Vegetation)

Canada goldenrod-Yarrow Herbaceous Vegetation (*Solidago canadensis*-*Achillea millefolium* Herbaceous Vegetation)

Alpine hulsea-Alpine goldenbush-Alpine phacelia Herbaceous Vegetation (*Hulsea algida*-*Ericameria discoidea*-*Phacelia hastata* ssp. *compacta* Herbaceous Vegetation) (Taylor, 1984)

King's sandwort-Western needlegrass Herbaceous Vegetation (*Arenaria kingii compacta*-*Achnatherum occidentale* Herbaceous Vegetation)

ALPINE ASTER (*Aster alpigenus* ssp. *andersonii*) HERBACEOUS ALLIANCE??

HAIRY ARNICA HERBACEOUS ALLIANCE?? (ARNICA MOLLIS HERBACEOUS ALLIANCE)

Broadleafed lupine Herbaceous Vegetation (*Lupinus latifolius* Herbaceous Vegetation)

BISTORT HERBACEOUS ALLIANCE (*POLYGONUM BISTORTOIDES HERBACEOUS ALLIANCE*) (Ratliff, 1982, 1985)

Narrow-leaf bur-reed Herbaceous Vegetation (*Sparganium angustifolium* Herbaceous Vegetation)

YELLOW STAR THISTLE HERBACEOUS ALLIANCE?? (*CENTAUREA SOLSTITIALIS* HERBACEOUS ALLIANCE)

Ripgut brome-Soft chess-Annual clover-Wild carrot (*Bromus diandrus*-*Bromus hordeaceus*-*Trifolium* spp.-*Daucus pusillus* Herbaceous Vegetation)

Shrublands:

Bush lupine Shrubland (*Lupinus albifrons* Shrubland)

Chamise-Whiteleaf manzanita Shrubland (*Adenostoma fasciculatum*-*Arctostaphylos viscida* Shrubland)

Chamise Shrubland (*Adenostoma fasciculatum* Shrubland)

Chamise-Wedgeleaf ceanothus Shrubland (*Adenostoma fasciculatum*-*Ceanothus cuneatus* Shrubland)

Wedgeleaf ceanothus/Grass Shrubland (*Ceanothus cuneatus*/grass Shrubland)

Chaparral whitethorn/poison oak shrubland (*Ceanothus leucodermis*/*Toxicodendron diversilobum* Shrubland)

Interior live oak-California buckeye Shrubland (*Quercus wislizeni*-*Aesculus californica* Shrubland)

Interior live oak/Poison oak Shrubland (*Quercus wislizeni*/*Toxicodendron diversilobum* Shrubland)

Mountain misery Dwarf-Shrubland (*Chamaebatia foliolosa* Dwarf-Shrubland)

Huckleberry oak Shrubland (*Quercus vaccinifolia* Shrubland)

Huckleberry oak-Bush chinquapin Shrubland (*Quercus vaccinifolia*-*Chrysolepis sempervirens* Shrubland)

Big sagebrush-Rubber rabbitbrush Shrubland (*Artemisia tridentata*-*Ericameria nauseosus* Shrubland)

Big sagebrush/Indian ricegrass Shrubland (*Artemisia tridentata*/*Achnatherum hymenoides* Shrubland)

Big sagebrush/Mountain pennyroyal Shrubland (*Artemisia tridentata*/*Monardella odoratissima* Shrubland)

Narrow-leaf willow/Rush Shrubland (*Salix exigua*/*Juncus* spp. Shrubland)

Tea-leaved willow Shrubland (*Salix planifolia* Shrubland)

Arroyo willow Shrubland (*Salix lasiolepis* Shrubland)

Arroyo willow-Canyon live oak/Spice bush Shrubland (*Salix lasiolepis*-*Quercus chrysolepis*/*Calycanthus occidentalis* Shrubland)

Lemmon's willow Shrubland (*Salix lemmonii* Shrubland)

Dusky willow Shrubland (*Salix melanopsis* Shrubland)

Tobacco brush-Bitter cherry-Big sagebrush Shrubland (*Ceanothus velutinus*-*Prunus emarginata*-*Artemisia tridentata* Shrubland)

Antelope bitterbrush-Big sagebrush-Tetradymia Shrubland (*Purshia tridentata*-*Artemisia tridentata*-*Tetradymia canescens* Shrubland)

Antelope bitterbrush-Big sagebrush/Indian ricegrass Shrubland (*Purshia tridentata*-*Artemisia tridentata*/*Achnatherum hymenoides* Shrubland)

Antelope bitterbrush-Big sagebrush/Nelson's Needlegrass Shrubland (*Purshia tridentata*-*Artemisia tridentata*/*Achnatherum nevadense*-(*Achnatherum nelsonii*) Shrubland)

Antelope bitterbrush/Sulphurflower Shrubland (*Purshia tridentata*/*Eriogonum umbellatum* Shrubland)

Antelope bitterbrush-Big sagebrush-Roundleaf snowberry Shrubland (*Purshia tridentata*-*Artemisia tridentata*-*Symphoricarpos rotundifolia* Shrubland)

Mountain Big sagebrush/Shorthair sedge Shrubland (*Artemisia tridentata* ssp. *vaseyana*/*Carex exserta* Shrubland)

Low sagebrush/Prickly phlox Dwarf-Shrubland (*Artemisia arbuscula*/*Leptodactylon pungens* Dwarf-Shrubland)

Low sagebrush/Slender buckwheat Dwarf-Shrubland (*Artemisia arbuscula*/*Eriogonum microthecum* Dwarf-Shrubland)

Silver sagebrush/Missouri iris-Baltic rush Shrubland (*Artemisia cana*/*Iris missouriensis*-*Juncus balticus* Shrubland)

Deer brush-Whiteleaf manzanita Shrubland (*Ceanothus integerrimus*-*Arctostaphylos viscida* [*Arctostaphylos mewukka*] Shrubland)

Deer brush-Mountain whitethorn Shrubland (*Ceanothus integerrimus*-*Ceanothus cordulatus* Shrubland)

Oceanspray-Mountain red elderberry Shrubland (*Holodiscus discolor*-*Sambucus racemosa* Shrubland)

Oceanspray/Sierra stonecrop-Parsley fern Shrubland (*Holodiscus discolor*/*Sedum obsusatum* ssp. *boreale*-*Cryptogramma acrostichoides* Shrubland)

Bitter cherry Shrubland (*Prunus emarginata* Shrubland)

Sierra bilberry/Shorthair sedge Dwarf-Shrubland (*Vaccinium caespitosum*/*Carex exserta* Dwarf-Shrubland)

Forests and Woodlands:

Knobcone pine/Chamise Woodland (*Pinus attenuata*/*Adenostoma fasciculatum* Woodland) (no samples; a mapping unit or putative type)

Knobcone pine/Whiteleaf manzanita Woodland (*Pinus attenuata*/*Arctostaphylos viscida* Woodland)

Foothill pine/Wedgeleaf ceanothus/grass Woodland (*Pinus sabiniana*/*Ceanothus cuneatus*/grass Woodland)

Foothill pine-Interior live oak/Wedgeleaf ceanothus Woodland (*Pinus sabiniana*-*Quercus wislizeni*/*Ceanothus cuneatus* Woodland)

Foothill pine-Interior live oak/Chamise Woodland (*Pinus sabiniana*-*Quercus wislizeni*/*Adenostoma fasciculatum* Woodland)

Foothill pine-Interior live oak/Whiteleaf manzanita Woodland (*Pinus sabiniana*-*Quercus wislizeni*/*Arctostaphylos viscida* Woodland)

Birch-leaf mountain mahogany Woodland (*Cercocarpus montanus* var. *glaber* [*C. betuloides* var. *betuloides*, Hickman 1993] Woodland)

Birch-leaf mountain mahogany/Wedgeleaf ceanothus-flowering ash Woodland (*Cercocarpus montanus* var. *glaber* [*C. betuloides* var. *betuloides*, Hickman 1993]/*Ceanothus cuneatus*-*Fraxinus dipetala* Woodland)

Interior live oak-Canyon live oak Woodland (*Quercus wislizeni*-*Quercus chrysolepis* Woodland)

Interior live oak-Whiteleaf manzanita Woodland (*Quercus wislizeni*-*Arctostaphylos viscida* Woodland) (Allen et al., 1991)

California buckeye/Blue bush lupine Woodland (*Aesculus californica*/*Lupinus albifrons* Woodland)

California buckeye/Durango root Woodland (*Aesculus californica*/*Datisca glomerata* Woodland)

Blue oak/Nonnative brome grass-Wild carrot (*Quercus douglasii*/*Bromus* sp.-*Daucus pusillus* Woodland) (equivalent to Allen et al., 1991 blue oak/grass subseries)

RED WILLOW WOODLAND ALLIANCE (*SALIX LAEVIGATA* TEMPORARILY FLOODED WOODLAND ALLIANCE)

Ponderosa pine-Black oak/Whiteleaf manzanita Woodland (*Pinus ponderosa*-*Quercus kelloggii*/*Arctostaphylos viscida* Woodland)

Jeffrey pine-White fir/Squirreltail grass Woodland (*Pinus jeffreyi*-*Abies concolor*/*Symphoricarpos rotundifolius*/*Elymus elymoides* Woodland)

Jeffrey pine/Mountain whitethorn Woodland (*Pinus jeffreyi*/*Ceanothus cordulatus* Woodland) (Potter, 1998)

Lodgepole pine-whitebark pine/shorthair sedge (*Pinus contorta* ssp. *murrayana*-*Pinus albicaulis*/*Carex exserta*)

Whitebark pine/Davidson's penstemon Woodland (*Pinus albicaulis*/*Penstemon davidsonii* Woodland) (Taylor, 1984)

Whitebark pine/Ross sedge Woodland (*Pinus albicaulis*/*Carex rossii* Woodland) Includes the Whitebark pine/Wheeler bluegrass Woodland (*Pinus albicaulis*/*Poa wheeleri* Woodland) of Taylor (1984)

Sierra juniper/Curlleaf mountain mahogany/Big sagebrush Woodland (*Juniperus occidentalis* ssp. *australis*-*Cercocarpus ledifolius*/*Artemisia tridentata* Woodland)

Red fir-Western white pine/Huckleberry oak Forest (*Abies magnifica*-*Pinus monticola*/*Quercus vaccinifolia* Forest)

Western white pine-Lodgepole pine/Western Needlegrass Woodland (*Pinus monticola*-*Pinus contorta* var. *murrayana*/*Achnatherum occidentale* Woodland)

Singleleaf pinyon pine/Curlleaf mountain mahogany/Big sagebrush-Antelope bitterbrush Woodland (*Pinus monophylla*/*Cercocarpus ledifolius*/*Artemisia tridentata*-*Purshia tridentata* Woodland)

Singleleaf pinyon pine/Big sagebrush/Squirreltail Woodland (*Pinus monophylla*/*Artemisia tridentata*/*Elymus elymoides* Woodland)

Singleleaf pinyon pine/Gummy gooseberry (*Pinus monophylla* / *Ribes velutinum* Woodland)

Aspen-Lodgepole pine/Big sagebrush/Kentucky bluegrass Forest (*Populus tremuloides*-*Pinus contorta* ssp. *murrayana*/*Artemisia tridentata*/*Poa pratensis* Forest)

Aspen/Big sagebrush Forest (*Populus tremuloides*/*Artemisia tridentata* Forest)

Aspen/Big sagebrush/Mountain pennyroyal-Kellogg Forest (*Populus tremuloides*/*Artemisia tridentata*/*Monardella odoratissima*-*Kelloggia galioides* Forest) (n=6) (close to Potter's 1998 *Populus tremuloides*/*Monardella odoratissima*)

Aspen/Woods rose Forest (*Populus tremuloides*/*Rosa woodsii* Forest)

Aspen/ Kentucky bluegrass (*Populus tremuloides* /*Poa pratensis*) (similar to some Wexelman and Zemudio plots (1999)

California black oak/Mewuk manzanita-Mountain misery Forest (*Quercus kelloggii*/*Arctostaphylos mewukka*-*Chamaebatia foliolosa* Forest)

Black oak-Incense cedar Forest (*Quercus kelloggii*-*Calocedrus decurrens* Forest)

Black cottonwood-Jeffrey pine Forest (*Populus balsamifera* ssp. *trichocarpa*-*Pinus jeffreyi* Forest)

Black cottonwood/Western azalea Forest (*Populus balsamifera* ssp. *trichocarpa*/*Rhododendron occidentale* Forest)

Velvet Ash Forest Alliance (*Fraxinus latifolia* Forest Alliance) (defined by Potter 2000 ms plots)

Note: The following are types with little or no sampling that as a result didn't make it into the classification but were observed or expected in Yosemite region and could be defined with sufficient sampling:

Knobcone pine/Chamise Woodland (*Pinus attenuata*/*Adenostoma fasciculatum*) (may include wedgeleaf ceanothus)

Foothill pine-Interior live oak/Chamise (*Pinus sabinana*-*Quercus wislizeni*/*Adenostoma fasciculatum*) (pi signature)

LIMBER PINE WOODLAND ALLIANCE (*PINUS FLEXILIS* WOODLAND ALLIANCE) (present on east slope)

Breweri oak Forest (*Quercus garryana* var. *breweri* Forest)

ALPINE SAXIFRAGE HERBACEOUS ALLIANCE (*SAXIFRAGA TOLMIEI* HERBACEOUS ALLIANCE)

YELLOW POND-LILY PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE
NUPHAR LUTEUM PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE

Potamogeton (*diversifolius*, *filiformis*) Permanently Flooded Herbaceous Alliance

TUFTED HAIRGRASS SEASONALLY FLOODED HERBACEOUS ALLIANCE (*DESCHAMPSIA CESPITOSA* SEASONALLY FLOODED HERBACEOUS ALLIANCE)

Tufted Hairgrass Herbaceous Vegetation (*Deschampsia caespitosa*-*Polygonum bistortoides* Herbaceous Vegetation) **Note:** as a result of the overlap between associations defined either from limited data or from elsewhere in the Sierra, the 13 samples collected representing this alliance were lumped into one association with *P. bistortoides* as the main indicator species. The following previously defined associations have been at least temporarily subsumed for the Yosemite classification: Tufted hairgrass-Coville ragwort (*Deschampsia caespitosa*-*Senecio scorzonella*) assoc. (Benedict 1983)] (N=4) 98M93 98M82 99K151 99K173 ; Tufted hairgrass-mountain goldenrod (*Deschampsia caespitosa*-*Solidago multiradiata*) assoc. (Taylor 1984)] (N=1) 99K174 ; Tufted hairgrass (*Deschampsia caespitosa*) assoc. (N=5) 99K107 | 99K101 | 99K139 | 98M81 | Potter 1650; Tufted hairgrass -Longstalk clover (*Deschampsia caespitosa*-*Trifolium longipes*) assoc. (Ratliff 1982, 1985) (N=1) 99S119; and Tufted hairgrass-Brewer bittercress assoc. (*Deschampsia caespitosa*-*Cardamine breweri*) (Benedict 1983) (N=2) 99S114 | 99S118 . Description written.

BISTORT ALLIANCE (*POLYGONUM BISTORTOIDES* ALLIANCE) (validity of alliance is in question)

SNOW WILLOW ALLIANCE (*SALIX RETICULATA* ALLIANCE)

CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Western blueberry Dwarf-Shrubland (*Vaccinium uliginosum* Dwarf-Shrubland)

LIMBER PINE WOODLAND ALLIANCE (*PINUS FLEXILIS* WOODLAND ALLIANCE) (stands present on east slope)